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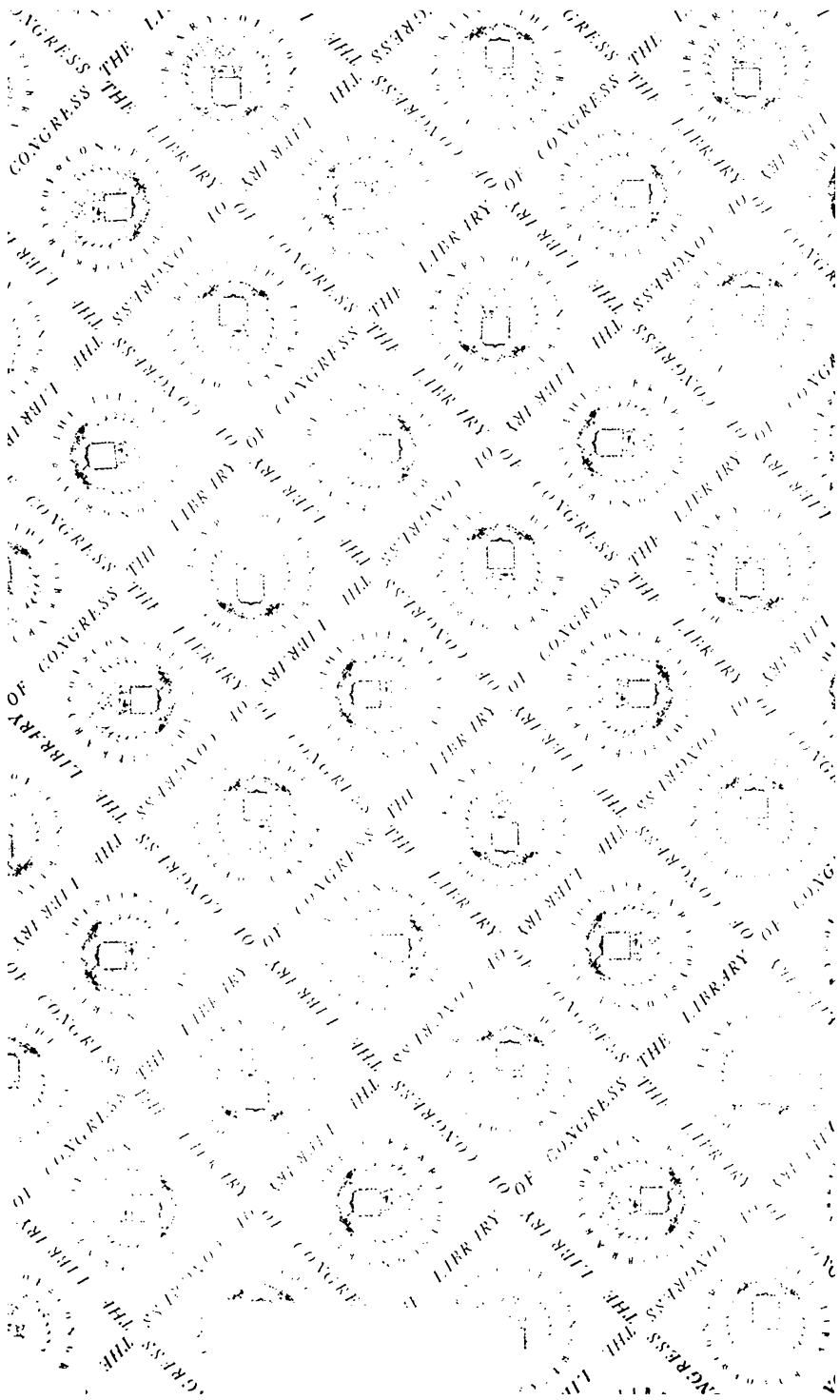
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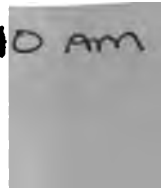


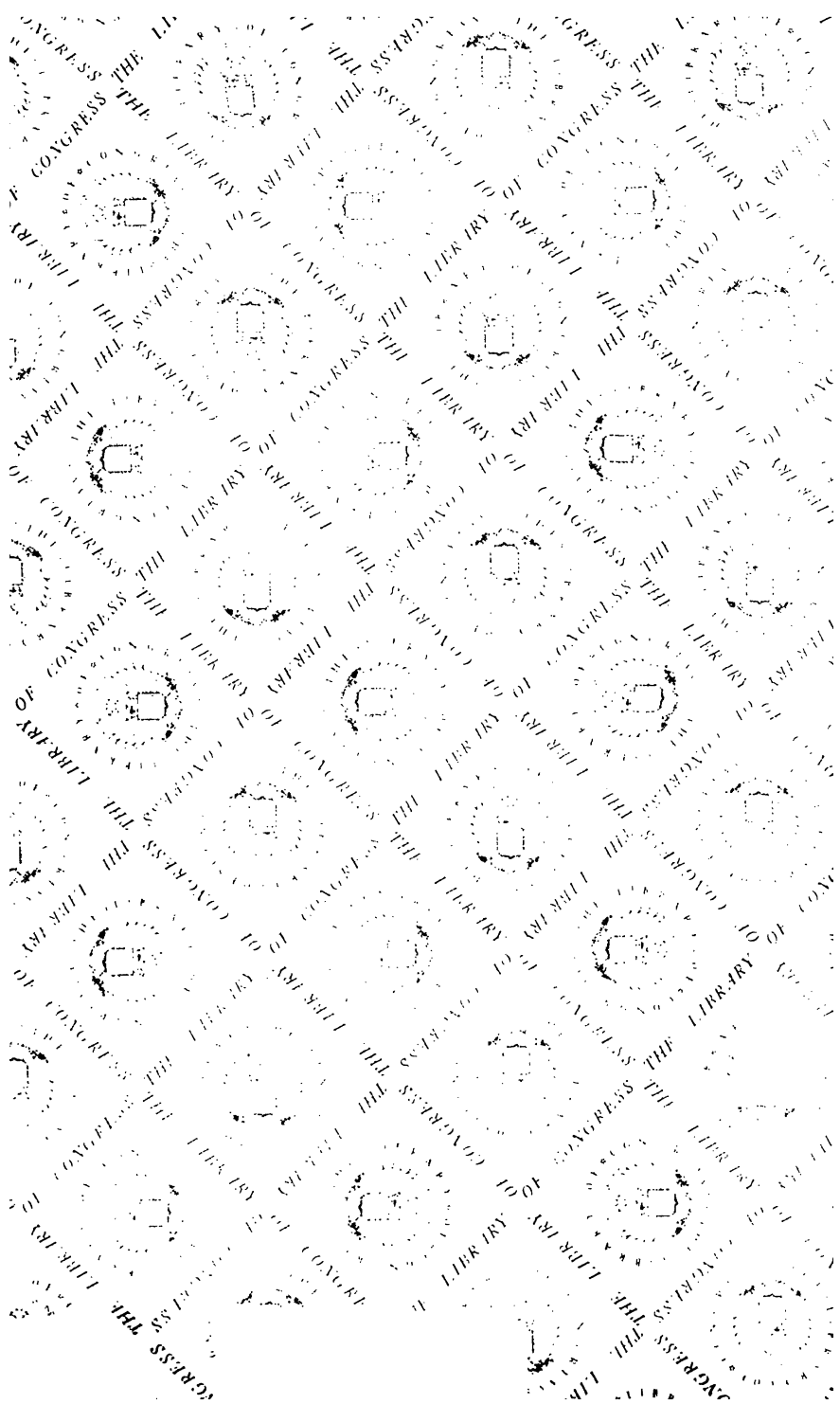
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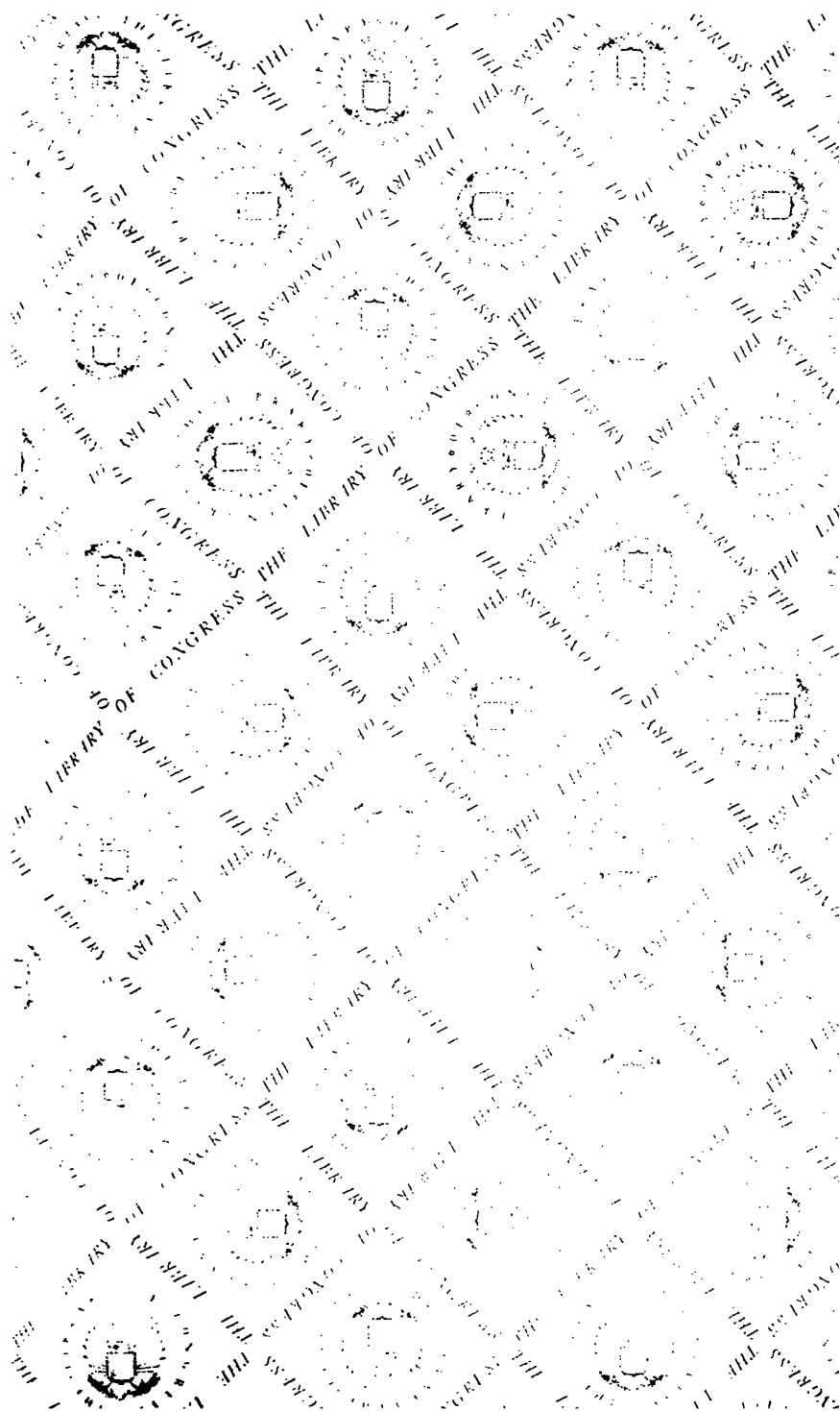


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THE
QUARTERLY
JOURNAL OF AGRICULTURE.

VOL. VII.

JUNE 1836—MARCH 1837.

WILLIAM BLACKWOOD & SONS, EDINBURGH;
AND T. CADELL, STRAND, LONDON.

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CONTENTS.

	Page.
I. Biographical Memoir of the late Right Honourable Sir John Sinclair, Bart., Founder and First President of the Board of Agriculture, &c. &c. &c.	1
II. On Hedge-birds, which are alleged to be more or less destructive to Field or Garden Crops. No. I.	38
III. On the Agriculture of the County of Armagh. By Mr Henry L. Lindsay, Civil Engineer, and County Surveyor of Armagh,	54
IV. On the Disease in Oats called "Segging." By Mr Roderick Gray, Peterhead,	76
V. Horticulture—Common Cabbage, Early York Cabbage, London New York Cabbage, Savoy, Broccoli, and Early White Warwick Pea. By Mr Towers, Author of the Domestic Gardener's Manual, C. H. M. S., &c.,	76
VI. On an Improvement in the Indian Saw. By Mr Arthur Johnson, Rampisham, Dorset,	85
VII. Retrospect of the British and Foreign Corn Trade during the half-year preceding May 1836. By Mr William Gray Fearnside, Mark Lane, London,	85
VIII. Quarterly Agricultural Report, Committee on the State of Agriculture—Pawnbrokers' Society—Sugar Refining Company from Sugar Beet—Railroads—Islington Market—Agricultural Pamphlets—Quarterly Journal of Agriculture—Book Farming.	102
IX. Tables of the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn; of the Revenue; Fiar Prices for Crop 1835,	107
X. Biographical Memoir of the late Right Honourable Sir John Sinclair, Bart., Founder and First President of the Board of Agriculture, &c. &c. &c.	111
XI. On the Winter Management of Potatoes. By Mr Towers, Author of the Domestic Gardener's Manual,	150
XII. Australian Colonies. By Mr G. Mackillop, Hobart Town,	155
XIII. On the Causes of Failure in Moss Improvements. By Mr Alexander Blackadder, Allan Park, Stirling,	169
XIV. Some Account of Flemish Husbandry. By Mr Thomson, Banchory,	174
XV. On the Culture of Brank or Buck-wheat. By Mr Main, Chelsea,	180

	Page
XVI. On Hedge-birds which are alleged to be more or less destructive to Field or Garden Crops. No. II.	184
XVII. On the Prevention and Cure of Rot in Sheep. By Mr Edward King, Steam-Carriage Station, Hammersmith, London,	190
XVIII. On the Claims of the Landed Interest to Legislative Protection,	213
The Claims of the Landed Interest to Legislative Protection considered. By William Blacker, Armagh.	
XIX. On the Application of Steam to the Purposes of Husbandry.—No. IV.	225
XX. On a Safe Method of Feeding Cattle with Potatoes,	243
XXI. On an Economical Mode of Furrow-Draining,	244
XXII. On making Draining Tiles of Peat,	246
XXIII. On Crossing Breeds of Cattle. By Mr James Dickson, Cattle-Dealer, Edinburgh,	247
XXIV. Miscellaneous Notices,	255
I. Agricultural Colleges, 255.—II. French and English Rural Comforts, 256.—III. Moving Bog, 257.—IV. Origin of Eating Goose on Michaelmas Day, 258.	
XXV. Quarterly Agricultural Report,—Agricultural Committees of the Houses of Lords and Commons,—Experimental Farms,—Agriculturist's Manual,	258
XXVI. Tables of the Revenue; the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn,	266
XXVII. Biographical Memoir of the late Right Honourable Sir John Sinclair, Bart., Founder and First President of the Board of Agriculture, &c. &c. &c.	269
XXVIII. On Hedge-birds which are alleged to be more or less destructive to Field or Garden Crops. No. III.	284
XXIX. Horticulture—Peas, Beans, Radishes, Lettuce, Cabbage, Onions. By Mr Towers, C. M. H. S., Author of the Domestic Gardener's Manual,	303
XXX. On Purifying Salt made from Sea-Water,	313
XXXI. On the Agriculture of the County of Kerry. ¹¹⁸	317
XXXII. The Process of Rumination or Chewing the Cud in Cattle, explained by the experiments of M. Flourens,	344
XXXIII. The Agricultural Committee,	368
Remarks on the Present State of Agriculture, in a Letter addressed to his Constituents, by Charles Shaw Lefevre, Esq. M. P., Chairman of the Select Committee appointed to inquire into the State of Agriculture. Session 1836.	
The Show of the Highland and Agricultural Society, Edinburgh, 1836,	403
The British and Foreign Corn Trade during the Session 1836, by Mr William Gray Fearn-	414
The Prolific Wheat,	

437; 2d, Whittington's Wheat, 437; 3d, Smoothey's, or Boishall New Red Wheat, 437; 4th, Waterloo Red Wheat, 438; 5th, Cumberland Early Oat, 438; 5th, Orange, Red, and White Globe Mangel Wurzel, 438.—II. On Tanks for Water, 238.—III. Meeting of Potato-Dealers at Perth, 430.—IV. Novel and Important Use of Brine, 440.	
XXXVII. Quarterly Agricultural Report,	441
XXXVIII. Tables of the Revenue; the Prices of Grain, Butcher Meat, and Wool; of the Monthly Returns of Foreign Corn, &c.	442-444
XXXIX. Studies in the Science and Practice of Agriculture, as connected with Physics,	445
XL. Horticulture—On the Culture of the Onion, the Leek, and the Early Potato. By Mr Towers, Author of the Domestic Gardener's Manual,	472
XLI. Extracts from a Journal of a Tour in Holstein,	481
XLII. On crossing the Short-Horn with other Cattle. By Mr James Dickson, Cattle-Dealer, Edinburgh,	495
XLIII. On the Agricultural Condition of Western Australia, "The State and Position of Western Australia, commonly called the Swan River Settlement." By Captain Frederic Chidley Irwin, of H. M. 63d Regiment, late Commandant of the Troops, and acting Governor of the Colony. London, Simpkin & Co., Stationers' Court; and J. Cross, 18, Holborn. 1835,	515
XLIV. Some Account of the Fairs in Scotland.—	
iv. Selkirkshire,	526
v. Peeblesshire,	531
vi. Linlithgowshire or West-Lothian,	536
XLV. On Experimental Farms,	538
Observations on the Present State and Future Prospects of Agriculture, illustrative of the Advantages of an Experimental Farm. By George Lewis, Tenant in Boglillie, near Kirkcaldy. G. S. Tullis, Cupar; A. & C. Black, Edinburgh; Longman & Co., London. 1836.	
XLVI. On an Expeditious and Economical Method of Improving Grass Land in Scotland,	547
XLVII. Table of the Fiar Prices of Wheat in the County of Fife, from 1622 to 1835, including a period of 214 years, in series of 19 years each. By Mr Robert Ballingall, Newton of Kingsdale, Fife,	556
XLVIII. Account of the Turnip Saw-Fly (<i>Athalia Spinorum</i>). By James Duncan, M. W. S. &c. &c.	570
XLIX. On the past and present State of Horses,	571
A Comparative View of the Form and Character of the English Racer and Saddle-Horse, during the last and present Centuries. Illustrated by Eighteen Plates of Horses. London, Thomas Hookham, 15 Old Bond Street. 1836.	
L. On the Degeneracy of the Cultivated Varieties of the Potato. By Mr Gorrie, Annat Garden,	

	Page
LI. Miscellaneous Notices,	
i. On a particular Mode of applying Manure, by Mr John Baker, Nassau Cottage, Leeds, 584.—ii. Canada Wheat, 587.—iii. Mode of supporting the Poor in Belgium, 588.—iv. Progress of Digestion, 589.—v. Stephens's Writing Fluid, 590.—vi. Grants of Public Money to Scotland and Ireland, for ten years from 1823 to 1833, 592.—vii. A Machine on a new Principle, for raising Water, Coals, &c.—viii. Shoes impervious to Water, 594.—ix. Dovetailing Wood, 595.—x. Etymology of Antimony, 595.—xi. Suc-cory Coffee, 595.—xii. A new Method of Playing the Vio-lin, 595.—xiii. Wear of Carriage Wheels, 595.—xiv. An-cient Agricultural Societies, 596.—xv. Busts and Portraits, 596.—xvi. Burying in Cross Roads, 596.	
LII. Quarterly Agricultural Report,	596
LIII. Tables of the Revenue ; the Prices of Grain, Butcher Meat, and Wool ; of the Monthly Returns of Foreign Corn, &c.	598-600
INDEX,	601

THE
QUARTERLY
JOURNAL OF AGRICULTURE.

BIOGRAPHICAL MEMOIR OF THE LATE RIGHT HONOURABLE
SIR JOHN SINCLAIR, BARONET, FOUNDER AND FIRST PRESIDENT OF THE BOARD OF AGRICULTURE, &c.

(Continued from vol. vi. p. 602.)

WE have spoken of the Statistical Account of Scotland as a great national undertaking, equally honourable to Sir John Sinclair who planned, and to the Clergy of the Church of Scotland who seconded him in the accomplishment. We have also hinted at the general scepticism, which might have damped a less ardent spirit at the commencement of that laborious investigation, as to the chances of carrying such a gigantic scheme to a successful termination. Nor is it to be wondered at, if it was regarded generally as one fraught with difficulties, seeing that it had so signally failed in most of the countries where it has been before attempted; and that, in none had it succeeded to any general extent. Works requiring great expenditure of time and labour have been not only projected, but accomplished by individuals, the exertions of course depending on themselves, and the means of information lying within a sphere, which, with these exertions, it was possible for them to reach. But here the difficulty lay of rousing others to exertion—in inspiring them with just views of the importance of the end to be attained. The cordial co-operation of hundreds was necessary, most of whom, it is to be feared, were little less than lukewarm, and not a few undisguisedly opposed. It is only necessary to take a slight European survey of what had been attempted in this way, and

of what had failed, previous to the successful accomplishment of Sir John Sinclair's Statistical Account of Scotland, that we may be made aware how arduous ~~was~~ that task, and how great was the triumph over its difficulties.

So far back as 1575, as we are informed by the Reverend Mr Townsend in his Travels through Spain,* a schedule of questions had been addressed to all the prelates and corregidores of that country, by Philip II., a copy of which he had seen at Barcelona. A report was required on no less than fifty-seven heads, relating chiefly to geography, natural and civil history, agriculture and mineralogy, together with several others purely statistical. It is evident from these queries, that Philip wished to gain a knowledge of the internal state of his kingdom; but Mr Townsend was not able to find out any papers containing the corresponding answers; and, as no notice of the inquiry is taken by any of the historians of the period, it is probable that the scheme was never generally followed out.

In Sweden, the celebrated Gustavus Adolphus made the second attempt of this nature that we find recorded in European history. This took place in 1630; and was conveyed in the shape of a circular from the Archbishop of Upsal to the clergy of his diocese. It related principally to matters of antiquity; but was extended to every thing which could be supposed to add to the prosperity of the country.† The information thus collected was to be deposited in the Royal Cabinet, and the results were to be afterwards published for the benefit and improvement of the kingdom. The third attempt of which notice has been taken was made in France by Louis Quatorze, about 1698; but the accounts of the different provinces, ordered to be drawn up by the intendants, were never published. With regard to this undertaking, Vol-

* Townsend's Travels through Spain, 2d edit. vol. iii. p. 351. *Vide* also Statistical Account of Scotland, vol. xx. Appendix to Introduction, p. lxxi. and Analysis of Statistical Account, 1807, part 1st, p. 64. *et seq.*

† A translation of this document, which is extremely curious, by Mr . . . Gottenburgh, in Appendix to Introduction to vol. xx. Statistical Account, p. 71-2.

For a more modern view of the political state of Sweden *vide* "Mémoire pour servir à la Connoissance des Affaires Politiques et Économiques de Suède par Monsieur Chazlen," Dresden, 1776.

taire has well remarked, that "had it been well executed, the collection would have been one of the most valuable monuments of the age." He mentions with great approbation the account of Languedoc, which he had read in the manuscript;* but Sir John Sinclair having, through the kind attention of Dr Nash of Bevere in Worcestershire, had an opportunity of examining the same document, found it incredibly defective and meagre, and but a wretched specimen of what such an investigation ought to be. In the more laborious nation of Germany, statistical observations were made on a much more extensive scale, and Baron Bielfield has given an admirable account of the progress which such inquiries had made in that portion of the Continent.† The particulars which he has included as belonging to statistics, are much more extensive than had hitherto been comprehended as appertaining to that department of science. He takes in geographical position and general history, account of population, arrangement of public affairs, laws and political rights, church and judicial governments, police regulations, revenues and modes of collection and expenditure, state of arts and science, military and marine strength, resources from agriculture, natural productions, internal and external commerce, together with political relations to other states. To Professor Zimmermann‡ the public are indebted for conveying to them, in a tangible shape, the mass of information collected in the wide field of German statistics. In Denmark we only find some tables of the finances of that country, of its debts, expenditure, army and navy, which, printed in the German language, were only partially circulated by the government of that country, and never published.

When we turn from the Continent to the British isles, we find, that inquiries of this nature, on a limited or more extended scale, have long occupied attention. In 1081, a great survey of England was ordered by William the Conqueror, which was undertaken, to ascertain the income of the crown, and which has

* Voltaire, *Siecle de Louis XIV.* vol. ii. p. 128. ed. 1752.

† *Elements of Universal Erudition*, translated by Dr Hooper, three vols. 8vo. 1770. *Vide* vol. iii. cap. 13.

‡ *Political Survey of the Present State of Europe*, 8vo. 1787.

been termed "*Doomsday Book*."* It was six years in finishing, and gives an exact account of the landed property of the kingdom at that time. In general, the extent of proprietorship is given,—tenures, value, quantity of meadow, pasture, wood, and arable ground, and in some counties, we have the number of tenants, cottagers, and serfs who lived upon them. It is altogether an invaluable document, regarding the ancient state of England. We learn, from the British Topography of Gough, the indefatigable antiquarian,† that, at the time his work was published, nine out of the forty English counties had then found no historian, and that the collections, which had been made for eight others, had been withheld from the public, as late as 1780. These county reports are in general very incorrect and immethodical, written in an unpolished style, and inadequate to fulfil the end for which they were intended. We mention the justly celebrated *Britannia* of Camden, only to say, that its value consists much less in being a politico-economical, than an antiquarian manual; and the Political Survey of Great Britain by Dr Campbell, as a laborious work, full of intelligence, so far as it goes, but incomplete, in a melancholy degree, from want of materials.‡ The institution of the Board of Agriculture, which was moved for in Parliament by Sir John Sinclair, on 15th May 1793, was intended for statistical as well as agricultural objects; but, as we will almost immediately have occasion to allude to this subject at some length, suffice it to say, that, with regard to it, the arrangement which had been made for instituting parochial surveys, was afterwards abandoned, for the less sa-

* "This monument," says Hume, "called *Doomsday Book*, the most valuable piece of antiquity possessed by any nation, is still preserved in the Exchequer, and though only some extracts of it have hitherto been published, it serves to illustrate to us, in many particulars, the ancient state of England. The great Alfred had finished a like survey of the kingdom in his time, which was long kept at Winchester, and which probably served as a model to William in the undertaking." *History of England*, vol. i. p. 275., Ed. 1778.

† *British Topography* vol. i. p. 91.

‡ *Political Survey of Great Britain*, 3 vols. 4to. 1774. Of this work Dr Campbell says in the preface, "The Doctor, unfortunately had not leisure to complete such a work, in the manner in which it was intended. Had he lived a few years hence, possessed as he was of the necessary judgment his labours would have appeared to infinite advantage."

tisfactory system of county reports. In Ireland, the difficulties of obtaining information generally, were still greater, and the attempts made, at various times, to elucidate the statistics of that country, have been far from successful. Petty and Molyneux founded a society for philosophical investigations, but its existence only drawled out to the short period of five years; and it was succeeded by another, in 1760, by which a plan for drawing up descriptions of counties was promulgated, but that object was never attained. The Dublin Society, in 1773, printed a number of queries, and distributed them among the clergy; but, although 4000 circulars were sent round, only forty answers had been obtained at the end of four years, and a majority of these were trifling, meagre, and valueless. The scheme was therefore given up as hopeless, even by the enthusiastic Colonel Vallancy, who had been its principal promoter;* and, although it was subsequently taken up by Mr Shaw Mason, by whose exertions a number of parochial accounts were obtained, it was found impracticable as a whole, and ultimately abandoned.

With regard to Scotland, the spirit of statistical inquiry very early shewed itself; and, so far back as 1662, we find Bleau at work with his *Atlas Scotiae*, to accompany which, Sir Robert Gordon of Straloch, assisted by David Buchanan, drew up a description of several of the counties; but the civil wars of Charles I. unfortunately put a stop to their peaceful investigations. Sir Robert Sibbald originated the next attempt, but his inquiries were principally directed to the field of natural history; and his work, entitled *Atlas Scoticus*, still exists, according to Gough, in manuscript.† The late Walter Macfarlane of Macfarlane, whose MS. collections are still preserved in the Advocates' Library, left behind him a geographical description of several parishes, drawn up in 1772, and the immediately subsequent years.‡ An attempt of the same nature was made by

* "A zealous and public spirited member of the Irish Parliament (the Right Hon. William Burton Conynham), transmitted to me an account of the parish of Kilronan, in the county of Roscommon and the adjoining district, written by Mr Charles O'Connor, and dated Ballytra, near Carrick, 25th August 1773, which he informed me, was the only one worth preserving in the whole collection." Sir John Sinclair, in vol. xx. Statist. Acct.

† Topography, vol. ii. p. 557.

‡ "Who was the author of this attempt," says Sir John Sinclair, "does

Maitland, the well known author of the *History of London*, who circulated a number of printed queries; but the answers he received were so few and trifling, that the design was given up as abortive. Far more extensively successful than any of the preceding, was the undertaking of Dr Webster, begun in 1748, and completed in 1755, for ascertaining the state of the church, and the population of the kingdom. The work is now principally valuable as affording data for comparing the population of Scotland at the time it was drawn up, with the census of later years. We should also notice the attempts to procure information from the clergy, made by the distinguished naturalist Mr Pennant, whose works breathe throughout such a kindly feeling towards Scotland; and, by the late Earl of Buchan, as connected with the Society of Scottish Antiquaries. The wishes of Mr Pennant were but limitedly acceded to; and the society could only muster accounts of five parishes,—certainly of a valuable description—which are printed in the first volume of their transactions.

Such is a brief outline of the statistical inquiries regarding Europe in general, and Scotland in particular, which preceded the great and successful undertaking of Sir John Sinclair; and we have given it to shew, that those who looked primarily on the accomplishment of such a plan as chimerical, were not without ample grounds for indulging their scepticism. But the welfare of the human race seemed at all times to be uppermost in his mind, and such was his nerve and enthusiasm, that where good was the ultimate object, and that good at all within the verge of possibility, he was not to be daunted or deterred by envy, unworthy jealousies, difficulties, or delay. He kept the end of his labours steadily in view, and he knew well that nothing truly great is easily attainable. That a measure of self-gratulation may have sometimes infused itself, we doubt not, and can well pardon, for none are perfect; and we can believe his own words, when he frankly declares to us, after mentioning that his undertaking had been universally sneered at as impracticable, that “persecution to accomplish what others had failed to execute, was a great advantage.”

From a letter, beginning ‘Reverend Sir,’ signed Lud. Grant, dated Inverness, 14th July 1732; it seems to have been undertaken by some of the ministers of the Highlands. See the Appendix to vol. xx. *Statistical Acct.* p. 79.

was a stimulus to those efforts which carried through so great a work." He then adds, with becoming humility, that "its success is, in a great measure, to be attributed to those who entered daily with zeal into the cause, and encouraged the author to persevere, by their approbation and assistance."* We may fitly leave this part of our subject by extracting part of Mr Brown of Markle's dedication of his popular treatise on Rural Affairs to the subject of this memoir. "Often have I admired," he says, "the wisdom of your measures, and the steady perseverance displayed in bringing them to a happy issue. Obstacles might retard their success for a time, but these obstacles could neither damp your ardour, nor cause you to lose sight, for a moment, of the objects you had in contemplation. Perseverance is rarely bestowed upon great geniuses; but fortunately for the public, you are gifted with a stock of this quality, sufficient to remove difficulties of the greatest magnitude. When the Statistical Account of Scotland was set on foot, many people considered it as an undertaking which would never be finished. It was, however, soon proved, that the difficulty of the task served only to increase the force of your exertions."†

It was in 1790, as we have said, that Sir John Sinclair commenced in earnest with the Statistical Account of Scotland, a work which was not completed till 1798; but, in the interval, his active mind teemed with projects for the amelioration of society, and the aggregate happiness of the human race. We have already alluded to the first sheep-shearing festival, and it was on the 31st January 1791, that he proposed, at a meeting held in Edinburgh, the utility of establishing a society in Scotland, for the improvement of British wool. Of this society, as we have said, he was chosen president; and it continued to flourish for several years, during which a mass of useful information was collected, and a variety of experiments, connected with that important branch of rural economy, received sanction or disap-

* Analysis of Statistical Account, part first, p. 69-70.

† Brown's Treatise on Rural Affairs, vol. i. p. 7. The writer of this notice had some correspondence with Mr Brown, on the subject of the memoir of Mr Rennie of Phantassie, which appeared in No. 5. of this Journal. He had also the melancholy pleasure of a visit from him a few months before his death.

proval. * Indeed so great was the enthusiasm manifested by its members, that Sir John became impressed with the idea, that an institution for the improvement of agriculture, in an extended and comprehensive point of view, if patronized by Government, might be of the greatest consequence to the best interests of the British Empire.

With these convictions, Sir John Sinclair, in May 1793, printed and circulated a plan for establishing a Board of Agriculture and Internal Improvement, in which he pointed out the nature of its plan, and the beneficial results which might be expected from it. On the 15th of the same month he moved, in his place in Parliament, an address to the Crown, in favour of the proposed establishment. An animated and interesting debate took place on the occasion, which was adjourned till the 17th, when, on a division, it was carried by a majority of 75; 101 voting in its favour, and only 26 opposing it. In candour to the memory of Mr Pitt, it is but here right to acknowledge, that all the exertions of Sir John would have been in vain, at this time, had not the minister backed him, with the whole strength of his talents and influence. In an able speech on this occasion, Sir John endeavoured to shew the obvious advantages of such a Board, in a variety of lights. In the first place, he regarded it as a general magazine for agricultural knowledge, and a society of reference, to which any question might be sent, connected with the improvement of the country. In the second place, he shewed, that by agricultural surveys, carried on under the auspices of such a Board, every fact or observation known in this country, connected with the improvement of the soil, or the stock it maintained, would soon be collected. In the third place, by establishing an extensive foreign correspondence, the discoveries and improvements appertaining to other lands, would be much sooner and more widely rendered available, than if de-

For an excellent and circumstantial account of the origin and progress of the Society for the Improvement of British Wool, the reader is referred to Robertson's valuable work On the Agriculture of Mid-Lothian. Vide Appendix to that survey, No. 3.

In 1790, Sir John Sinclair published a pamphlet entitled "Report on the State of Shetland Wool;" and in 1791 another, which formed the substance of an "Address to the Society for the Improvement of British Wool, constituted at Edinburgh."

pendent solely on private exertion. In the fourth place, that it was only through the means of such a Board, that any general improvement of stock could be looked for; and that, in the last place, it might be the instrument of obtaining a statistical account of England. Sir John also proposed that the board should be entrusted with the privilege of franking, a point of very great importance, as without it no information could be rapidly spread over the country, except at an enormous expense. He suggested that the parliamentary grant should not exceed L. 3000 per annum; that the experiment should only have a trial of five years, in case of its not fulfilling the anticipations of utility he expected from it, and that the members should act without any emolument whatever.

On these grounds, Sir John moved an address to his Majesty on the subject; and the Board, soon after, was not only appointed, but received a charter from the Crown, in which he was nominated its first president. * To give the Board more weight and consequence, all the great officers of state, the two Archbishops, and the Bishops of London and Durham, were, *ex officio*, made members, in conjunction with thirty-one ordinary members.

It was soon sufficiently perceptible, that the institution would be fraught with the most important advantages to the nation, and the most distinguished characters were proud to have themselves enrolled as ordinary members, that they might be enabled personally to attend its meetings. From the spirit of enterprise and intelligence which was thus introduced, an immediate impetus was given alike to the study and the practice of agriculture, which assumed a dignity and importance which had not hitherto been attached to its cultivation. †

* For copy of the Charter of the Board of Agriculture, vide Communications to the Board of Agriculture, vol. i. 4to. Ed. 2d. Preliminary Observations, Appendix c. p. x-xvi.

† A curious literary bet was connected with this transaction, which we must here notice.

"Sir John Sinclair having accidentally mentioned to Mr Arthur Young, his intention of moving in Parliament for the Establishment of a Board of Agriculture, Mr Young said "that it was perfectly unnecessary to take that trouble, as there was not the least chance of success;" and the two authors differing in opinion, they resolved to lay a literary wager, which of them should

The following is the original list of the Members of the Board, as extracted from the charter:—Sir John Sinclair, Bart. President; John, Lord Archbishop of Canterbury; Alexander, Lord Loughborough, Lord High Chancellor of England; William, Lord Archbishop of York; Charles, Earl Cambes, Lord President of the Council; Granville Levison, Marquis of Stafford, Lord Keeper of the Privy Seal; William Pitt, Esq. First Commissioner of the Treasury; John, Earl of Chatham, First Lord Commissioner of the Admiralty; Beilby, Bishop of London; Shute, Bishop of Durham; William Wyndham, Baron Grenville, and Henry Dundas, Esq. the two Principal Secretaries of State; Charles Duke of Richmond, Master-General of the Ordnance; Henry Addington, Esq. Speaker of the House of Commons; Sir Joseph Banks, President of the Royal Society; John Robinson, Esq. Surveyor-General of Woods and Forests; and John Fordyce, Esq. Surveyor of the Crown lands; all *ex officio*. To these were added, Augustus Henry, Duke of Grafton; Francis, Duke of Bedford; Henry, Duke of Buccleuch; Thomas, Marquis of Bath; George, Earl of Winchelsea; James, Earl of Hopetoun; William, Earl Fitzwilliam;

prove in the right. Mr Young betted his *Annals of Agriculture*, against Sir John Sinclair's *Statistical Account of Scotland*.

"Soon afterwards, Sir John Sinclair wrote Mr Young that he was to have a conversation with Mr Pitt upon the subject, and that he would certainly gain his bet. Mr Young in his answer, dated 10th January 1793, said, "You are going to Mr Pitt, and I am to lose the wager; when you come from Mr Pitt, I shall win the wager. Pray don't give ministers more credit than they deserve. In manufactures and commerce you may bet securely, but they never did, and never will do, any thing for the plough. Your Board of Agriculture will be in the moon; if on earth remember I am to be secretary, provided the salary is good."

"After many delays in consequence of the very critical state of public affairs, the motion at last came on, and was carried by a large majority, and Sir John Sinclair had the satisfaction of announcing to Mr Young his success, and informing him, at the same time, that he had him in view for secretary. Though he lost his bet therefore, yet Mr Young sent his *Annals* to the bind-
and presented this copy to the president of the New Board."

The foregoing anecdote, related in the exact words we have given, is extracted from a fly leaf to the first volume of a handsome copy of the *Annals of Agriculture*, presented, on the occasion alluded to, by Mr Young to Sir John Sinclair. It is in a fine handwriting, but whether Mr Young's autograph or not, we are not certain.

George Wyndham, Earl of Egremont; James, Earl of Lonsdale; Francis, Earl of Moira; John Joshua, Earl of Carysford; Richard, Bishop of Landaff; Martin Bladen, Lord Hawke; Edward, Lord Clive; John Baker, Lord Sheffield; William Wyndham, and Charles Marsham, Esqs.; Sir Charles Morgan, Bart.; William Pulteney, Thomas William Coke, Thomas Pouys, Henry Duncombe, Edward Loveden Loveden, John Southey Somerville, Robert Barclay, Robert Smith, George Lumner, John Conyers, Christopher Willoughby, and William Geary, Esqs. England may look back to such a list with proud exultation; it contains names, which in history, in science, and art, have made her famous; and here were they conjoined together by a good and gracious king, the Father of his People, for the most pacific and benevolent of all purposes, the amelioration of human society. Verily, there were giants in the land in those days. Sir Thomas Call, Bart. was the first Treasurer of the Board; and Mr Arthur Young, the well-known writer on husbandry, and editor of the *Annals of Agriculture*, was, on the recommendation of his friend the President, appointed its Secretary.

On the first day of the Board being assembled, Sir John, as President, opened the business by an address. He commenced by saying, that, although in other countries attempts of a similar nature had been made on a humbler scale, yet, that he believed the present was the first instance of such an institution being invested with the privileges and consequent patronage of a public establishment. After adverting to the circumstance of his Majesty being pleased to nominate himself as President, simply from the circumstance of his having been the person who moved for such an institution in Parliament, he confessed that he would never have made such a motion had he not been fully aware of the importance of the subject, or without having previously sketched in his own mind the system which might be most usefully pursued. That, having carried on, for several years, correspondence with no less than 1500 individuals on the subject of British wool, and minutely examined into the political state of Scotland, he had thus gained no inconsiderable experience as to ascertaining the leading principles which should guide their present plans. In the first place, he thought there existed in these

kingdoms a fund of ability, information, and capital nowhere else to be found in the world ; and that the calling forth of that ability, collecting that information, and giving that capital a proper direction in increasing internal wealth and cultivation, would essentially add to the national prosperity. In the second place, he was satisfied that the Board would be able to prevail on active and intelligent husbandmen to follow any system that would contribute to the public good, and did not materially interfere with their own interests. In the third place, that nothing can resist industry and perseverance properly directed, and that he doubted not their exertions would cause many millions of acres, then defectively cultivated, to be greatly more productive ; bring many millions of acres, then lying waste, into cultivation, and at least double the stock of the kingdom in value. Sir John then went on to say, that their first object should be to ascertain facts, and that, for this purpose, an examination of the agricultural state of the different counties was essentially necessary. That the immense mass of information thus accumulated would answer two purposes ; it would point out where legislative measures could assist agricultural improvements, and it would instruct individuals,—the landlord to manage his property, and the tenant to cultivate his fields. In conclusion, he added, that Parliament might be of essential use to husbandry in two ways,—by removing discouragements, and by holding forth encouragements ;—that the instruction of individuals would be greatly furthered by the information which the Board could not fail to accumulate, alike by foreign and domestic correspondence ; that the most advantageous connection between landlord and tenant would be thus ascertained ; and that, if the measures he had hinted at, and others which he would yet venture to suggest, were approved of, and followed out with alacrity and zeal, he was willing to dedicate his whole time and exertions to their accomplishment, fully satisfied that no pursuits could be productive of more gratification for the present, or heartfelt satisfaction for the future.

Shortly after the establishment of the Board, its attention was directed to the formation of necessary bye-laws, by which its future proceedings were to be regulated, and the original sketch of these was drawn up with much attention and ability by Lord

Hawke; to whose assiduous zeal the establishment at this time was much indebted. A variety of important communications, on topics generally connected with agricultural inquiry, was transmitted both from home and abroad, some of which were printed separately, and others destined to be incorporated with the reports of the Board. The Committee, which had been appointed to take into consideration the state of the waste lands and common fields of the kingdom, proceeded spiritedly with their investigations, in which they were greatly assisted by Mr Robinson, the Surveyor-General of Woods and Forests; and, above all, great progress was made in the general agricultural survey, which was to form the grand basis of all their future proceedings and deliberations. Surveyors had been assigned to the different districts, each of whom was to give in his separate report. In an incredibly short time, no less than seventy-four reports of great value were presented; and, within a twelve-month from the establishment of the Board, nearly the whole survey was completed. No less than 80,000 copies of papers on agricultural topics had been circulated, and a taste for the subject was generated and fostered, as was apparent from the increased demand for all works connected with rural affairs. The Reports, after being given in and printed, were distributed among such as were supposed competent to add or to correct, and a great fund of information was thus obtained in the shape of marginal annotations.

At the next general meeting, held on 14th July 1795, the President announced, that not only had the rough draughts of the survey of each county been printed, but that the reprinting had commenced, from which it would be apparent what progress had been made in collecting additional information. During the same session of Parliament, a bill was brought in by Mr Gory, having first been recommended to the attention of the Board by one of its members, Sir Christopher Willoughby, to promote the interests, more especially of the lower orders of society, connected with husbandry,* by enabling them to lay out their little pittance to the best advantage for their families. By the recommendation of the Board, a sum was voted in behalf of Mr

* This act was entitled "For the more Effectual Prevention of the Use of Defective Weights, and of False and Unequal Balances."

Joseph Elkington, whose improvements in draining were of such boundless advantage to the country, and it was the more honourable to him who received it, as being the first ever voted by Parliament for any important discovery in Agriculture. From the deficiency of the crop of the preceding year, the Board appointed a committee to consider how the evil consequences of such an event could, in the exigency, be best remedied, and by their recommendation 5000 additional acres of potatoes were planted, being in itself a supply of that food adequate for nearly a million of people during six months. For the purpose of increasing the future culture of that valuable esculent, a report was also drawn up and printed, containing all the information which could be collected on the subject, either at home or abroad. A Special Committee was also appointed to take into consideration the situation and circumstances of the lower orders; and, connected with this subject, three points were unanimously agreed to, an improved construction of cottages, whereby the consumption of fuel might be diminished; the annexing of a considerable garden to each, by which means the labourer might be enabled, with the assistance of his family, to raise a considerable quantity of provisions without going to market; and the encouraging of Friendly Societies, those most felicitous of all institutions for benefiting the condition of the poor.*

Passing over a multitude of minor subjects, each useful in itself, which occupied the attention of the Board of Agriculture, certainly the drawing up of the reports, in which were detailed the agricultural and political state of the several counties of the kingdom, was of by far the greatest importance. For not only do they contain the best information on subjects merely agricultural, but in connection, we have every thing we could wish in the different departments of general knowledge of civil and ecclesiastical history, and of political economy.†

Vide Sir John Sinclair's Address to the Board, an. 1795. Appendix to the Account of the Origin of the Board of Agriculture, prefixed to vol. 1st of the Reports, an. 1804.

For a more full and complete view of the utility of such an undertaking, the late Emperor Alexander of Russia, at the expense of L.7000, accomplished a survey of the smallest provinces of his immense dominions, under the direction

Although connected in point of time with a subsequent era in the agricultural life of Sir John Sinclair, yet, in connection with what has been just said, it may not be out of place to mention here, that, principally by his indefatigable exertions, the survey of the whole of Great Britain was twice gone over; and the second time, according to a regular system. When we mention that this, the second survey, comprehended the publication of seventy octavo volumes, we need neither say that the task was appalling in its contemplation, nor was its accomplishment less than herculean.

As connected with the establishment of the Board of Agriculture, we may be permitted to extract the following passage from Dr Bisset's History of the reign of George III. "Agriculture," says that writer, "has never occupied a share of legislative attention proportioned to its momentous value, as a branch of political economy, since Britain became so eminent for manufactures and commerce. This is an omission, the consequences of which have been often fatally experienced, from recurring scarcities in a country, by the fertility of its soil, and the talents of its people, so adapted for securing plenty. An evil so frequent was naturally the subject of reiterated complaint; but no effectual means were employed to prevent it from often occurring again. Among the many ardent inquiries into political economy, one of the most active and indefatigable, whom an age supremely addicted to such studies has produced, is Sir John Sinclair. This gentleman, of a vigorous and acute understanding, enriched with knowledge and methodized by erudition, had bestowed great industry of research on various branches of political philosophy. He had traced, investigated, and presented to the public, the history of the revenue. In the progress of his pursuits, agriculture presented itself to him as an object most deserving of promotion. He saw that very much remained to be done; but before he could set about propositions of improvement, he thought it wisest and most expedient to ascertain the facts; and therefore sought information where useful information was most likely to be found. In Scotland, his native

of one of the surveyors of the Board of Agriculture. Napoleon with more energy, and a deeper sense of the importance of such a subject, did not stop until reports had been given in from all parts of the French empire.

country, he applied himself to the clergy, the best informed of any class of men of fixed rural residence, and addressed certain queries to the members of that numerous and respectable body. These queries, embracing the physical, moral, religious, and political situation of the respective parishes, in the result of the answers, produced an immense body of statistical knowledge, especially on pastoral and agricultural subjects. He afterwards less systematically and extensively executed, through different means, a similar plan in England. He advanced, however, so far as to ascertain a general fact of the very highest importance; that though, in some particular districts, improved methods of cultivating the soil are practised, yet, in the greater part of these kingdoms, the principles of agriculture are not yet sufficiently understood, nor are the implements of husbandry, or the stock of the farmer, brought to that perfection of which they are capable. To promote so desirable a purpose, Sir John Sinclair projected the establishment of "*A Board of Agriculture*," to be composed of gentlemen perfectly acquainted with the subject, and considerably interested in the success of the scheme, and who should act without any reward or emolument. An address was proposed to the King, praying him to take into his royal consideration the advantage that might accrue from such an institution. His Majesty directing the establishment of the Board, the Commons voted the necessary sums for defraying the expenses; and the Board of Agriculture was accordingly established.*

It may readily be supposed, that these patriotic exertions were not unattended with great pecuniary expense to their originator. The sum of L. 3000 per annum was infinitely too small for so extensive a purpose as the promotion of agricultural and social improvement in an empire like that of Great Britain, where the sources of wealth arising from trade and manufactures were so rich and multiplied. From this poverty of funds the operations of the Board were miserably hampered, and to make all possible saving, it for a long time met in the house of the President. The individual expense thereby incurred was far from inconsiderable, to which was superadded that attendant on meetings in distant counties, which it behoved Sir John to be

* History of the Reign of George III. vol. v. p. 367.

present at, as well as his expected subscriptions to all plans which had the promotion of agriculture for their ostensible object.*

Yet extensive as were these schemes of social improvement, and absorbed as Sir John Sinclair seemed in their accomplishment, he could find leisure for other duties, which arose out of the exigencies of the times. In the year 1794, when the wars of the French Revolution were involving Europe, and threatening the overthrow of every time-hallowed institution, Mr Pitt suggested, in the course of a conversation, that, as his estates lay in the north of Scotland, the inhabitants of which were attached to military pursuits, he would perhaps not object to raising a regiment of fencibles, the command of which might either devolve upon himself, or whatever relation or friend he might nominate. Sir John answered, "that he had never contemplated being a soldier, but as the public service required such exertions as he had mentioned, he would not hesitate a moment to enter into the plan proposed; and, instead of restricting the service to Scotland, which had hitherto been the case in regard to fencible corps, would at once agree to raise a battalion for the service of Great Britain. The minister was much pleased with this patriotic proposal, and no time was lost in procuring a letter of service, which was dated 7th March 1794. The regiment was speedily completed, and this first corps of British fencibles,—for originally the service was restricted to Scotland—was inspected at Inverness in October of the same year, by General Sir Hector Munro. Being clothed in the Highland costume, the appearance of the corps was highly military and imposing, a circumstance which certainly was not lessened by nineteen of the officers being above six feet in stature.† Government having subsequently resolved to disband all the fencible troops whose

* In a letter to Sir John Sinclair, which Dr Watson, the Bishop of Llandaff, has published in his *Anecdotes of his Own Life* (4to. 1818, p. 333.) that distinguished man says, "I admire that activity of mind which is incessantly prompting you to exertions for the public good." Both play and pay, however, were to Sir John's cost.

† The Highlanders in the town and neighbourhood of Inverness were thence led to give them the appellation of the "*Thier-nan-more*" or "the Great Chiefs." Vide Correspondence, vol. I. p. 206.

services were limited to Great Britain, this battalion was of course included in the number ; and, being at Newcastle when this order was issued, were thence marched, accordingly, for the purpose of being disbanded, to Edinburgh.

In the spring of the following year Sir John raised his second battalion of fencibles for the service in Ireland, to the north of which kingdom it was ordered, and where it remained for two years. This battalion was augmented to a thousand men. Such was the general attention paid to their appearance and health, that Lord Lake, after reviewing them at Cork, declared, that " although he had often heard before of a regiment of a thousand men, he had never seen one till that day." In consequence of the corps being so complete, Sir John was enabled to part with not fewer than 220 volunteers for the Egyptian expedition—no regiment of a similar description having ever furnished so great a number. The regiment was also so particularly distinguished for its discipline and excellent behaviour, that the magistrates of the county of Armagh, of whom Lord Gosford was chairman, unanimously voted an address to Lieutenant-Colonel Frazer, then in their command, an example which was afterwards followed by the inhabitants of the town of Middleton, couched in terms which were, if possible, still more gratifying and energetic.

The state of health in which this corps was kept is a very extraordinary circumstance, and well merits commemoration. Out of a body of one thousand men, officers included, the deaths in seven years amounted only to two of the latter and thirty-seven non-commissioned officers and privates—a mortality of less than three-fourths per man in every hundred annually ; and when the first battalion, consisting of six hundred men, were disbanded, as we have mentioned, at Edinburgh, there was not only not a sick man in the hospital, but every individual belonging to it, without a single exception, appeared on the field to deliver up his arms.

It may readily be conceived, that Sir John Sinclair could only occasionally devote himself to military pursuits, both from his Parliamentary duties and his presidency over the Board of Agriculture, a great part of whose business he personally performed ; yet, having been appointed to take the command of a camp, esta-

blished in 1795 for the purpose of defending the city of Aberdeen from the attack threatened upon it from the coast of Holland, he was thence led from the circumstances in which he found himself, and in accordance with that sleepless zeal which actuated him for the good of mankind, to pay more attention than he is likely otherwise to have done to the minutiae of military life. He accordingly took the state of that camp as ground matter for a tract, in which he enlarged, from the particulars before him, upon the principles which ought to regulate encampments in general.

In this tract he threw out a variety of judicious observations on the diet and health of the soldiers, on the smoking of tobacco under particular circumstances, and on dress. Sir John strongly recommended the bell tent, and suggested ventilating holes in the central pole, which, at the top, might be made larger for that special purpose. He considered entrenched camps as the best school for military education,—not only as a more rigid discipline can be kept up there than in common quarters, and that the men are more under command, but because the ditches drain the ground on which it is situated, and the mound affords excellent shelter in boisterous weather.

In connection with this subject we must briefly mention, that Sir John Sinclair suggested various improvements in the form of the musquet. He recommended only one pipe in the stock of the ram-rod, by which the stock would be strengthened, and injury to the hand from the ramrod, when loading, prevented. Also, that there should be a sight in the stock, for enabling the eye to catch objects; that the ramrod should be of equal thickness at both ends, to do away with the necessity of double turning in loading, and that it should be placed at the side opposite to the lock, because this would be nearer the soldier and farther from the bayonet.*

* Sir John Sinclair happening once to dine in company with Mr Wilkie, the painter, that distinguished artist was asked, in the course of conversation, if any particular circumstances had led him to adopt his profession. Sir John inquired, "Had your father, mother, or any of your relations a turn for painting? or what led you to follow that art?" To which Mr Wilkie replied, "The truth is, Sir John, that you made me a painter." "How, I?" exclaimed the Baronet, "I never had the pleasure of meeting you before." Mr Wilkie then gave the following explanation:—"When you were drawing

During the year 1796 the Board of Agriculture greatly extended its correspondence, notwithstanding the right of franking letters having been denied to its members, and all its operations were carried on with great vigour, although the annual government sum allowed was by far too little for the extensive objects in contemplation. From the high price of corn consequent on the failure of the crops in the preceding season, a select Committee was appointed, under the name of the Corn Committee; to take the subject into serious consideration; and, by the measures they recommended, the prices of grain considerably abated. These were, economization in the consumption of bread, using other varieties of grain as substitutes for wheat, and encouraging, by large bounties, the importation of foreign corn. To prevent the risk of a future scarcity, Sir John Sinclair, acting in the name of the Board, moved in Parliament for the appointment of a select committee to take into consideration the means of promoting the cultivation and improvement of the waste, unenclosed, and unproductive lands of the kingdom. To accomplish this grand purpose, a general bill of inclosure was recommended, and its value and necessity strongly urged; but the difficulties attending this scheme, and the opposition it so strenuously met with, rendered its pursuance at this time abortive.

A bill was, however, passed for allowing the importation of linseed or oil-cake and rape cakes from any foreign country in vessels built in Britain, without payment of duty. At the time this act was made, these two articles were little known in husbandry. The former was mentioned as a refuse, collected in the manufacture of linseed-oil, which was said to have been used in America for the feeding of cattle; and the latter, as a ma-

up the Statistical Account of Scotland, my father, who was a clergyman in Fife, had much correspondence with you respecting his parish, in the course of which you sent him a coloured drawing of a soldier, in the uniform of your Highland Fencible Regiment. I was so delighted with the sight, that I was constantly drawing copies of it, and thus insensibly was transformed into a painter."

What great results may be traced to small causes! The falling of apples from a tree is said to have suggested to Newton the theory of gravitation, and to the tones of a Welsh harp we owe "The Bard" of Gray. Who could have attributed the dawning of the matchless genius which created the Pitlessie Fair, the Rent Day, the Chelsea Pensioners, and other glories of British art, to an original circumstance so trifling in itself as the copying of a coloured print!

nure, which had been tried in several parts of the kingdom with advantage, and of which it was supposed that considerable quantities might be obtained from the continent of Europe. It seems to have been little dreamt of at the time, that importation was to be made to a tithe of the extent which it has reached of late years, or that it was ever to form such an extensive article of commerce.

So great was the number of communications transmitted to the Board on the subjects of farm-buildings, cottages, state of the poor, embankments, roads, and construction of mills, and some of them of such value, that it was resolved to publish a selection in a quarto volume. This was accordingly done in 1797, and was entitled, "Communications to the Board of Agriculture on Subjects relative to Husbandry and Internal Improvements." It was afterwards added to, from time to time, and a second edition appeared in 1804, in seven volumes quarto, with a great variety of plates and illustrations.

Although legislative sanction and countenance had been from the first given to the Board of Agriculture, yet the late Lord Melville assured Sir John Sinclair afterwards, that Mr Pitt and himself were at the time the only two members of the cabinet who had favourable ideas of the scheme; and that it was not without great difficulty that they managed to procure for it any ministerial countenance in the Lower House.

It would be foreign to the purpose of the present memoir, which is intended to shew the benefits which Sir John Sinclair has conferred on husbandry, to more than allude to the many subjects of collateral interest which, at various periods, occupied his ever wakeful attention. He had entered Parliament a few months before Mr Pitt; and, from the first, foresaw and foretold the future eminence of that illustrious man. A personal acquaintance was almost immediately brought about between them, through Mr Pitt's brother-in-law Lord Mahon; Sir John having distinguished himself previously by some appearances in the Senate, which indicated him to the embryo premier as a rising member. In the great contest of 1784, Sir John strenuously exerted himself to support him against the opposition of Mr Fox; and, for many years, such were the habits of intimacy subsisting between them, that Sir John had the entrée to his

house in Downing Street as if he had been a member of the cabinet. Subsequent occurrences unfortunately combined to render the footing less amicable, yet, through the friendly and patriotic mediation of Lord Melville, then Mr Secretary Dundas, many measures, originating with Sir John, continued to obtain the support of the minister. At his suggestion Mr Pitt, in 1793, proposed to Parliament the issue of Exchequer Bills;* and, by that means, the commercial distress of the country, which was urgent and threatening, to a degree perhaps never experienced during any prior era of our history, was greatly mitigated and relieved; a new impetus was given to trade, and national confidence was restored. On this occasion, as also in the establishment of a similar plan to relieve the merchants trading to Grenada and St Vincent's, who were at the time labouring under peculiarly adverse circumstances, Sir John acted as one of the Commissioners; and, by his exertions and activity, in a great degree, contributed to the success of both schemes.

No measure ever operated with more complete success than the issue of Exchequer bills did, in relieving the commercial distresses of the period; and, to its general scope and bearing Mr Pitt gave his hearty sanction; but, it should be added, that Sir John could not prevail upon him to adopt that part of his proposed system which was to avert similar evils for the future. This proposal was to compel bankers to find security for the issue of notes, and thereby limit the multiplication of such as were payable on demand. From this security not having been given, subsequent distresses ensued, and the crisis of 1797 was brought on, whereby the restriction on cash-payments was forced upon the country. While these circumstances were yet fresh in the public mind, Sir John made another attempt to establish the

* "I was informed by Mr Dundas, to whom I had communicated my intention, 'that unless something definite was previously arranged, the appointment of any Committee, to take up the subject loosely, might produce no chief with very little prospect of good; but that if I had any specific plan to state, Government would be glad to receive them.' In consequence of this hint, I transmitted to Mr Pitt, on the 16th April 1793, my plan for restoring the commercial credit of the country, and, on the 24th April following, that minister informed me that the plan had been approved of by his Majesty's Government, and that he wished to see me next morning, to fix the members who should compose the Committee."—*Correspondence of Sir*

system of licensing country bankers, but was again unsuccessful in his endeavours, not of shewing the necessity, for that was clear, but of overcoming the many private interests which were banded together against the attempt.*

Having accomplished the establishment of the Board of Agriculture, Sir John's next favourite project was to secure the passing of "A General Bill of Enclosure." He had ascertained from the surveys made, that nearly seven millions of acres were shut out from cultivation in England, on the plea that lands held in common could not be subdivided without Parliamentary authority. The expense of obtaining an act for every separate common or field was therefore a check to improvement, which was next to insurmountable. Sir John left no means untried for accomplishing the purpose he had in view, but he found the subject hedged in by obstacles on all sides, which could not be got over. For a little, while appearances were promising, both Mr Pitt and Mr Fox were members of the select committee on the subject, over which Sir John presided, and, with the assistance of some of the ablest lawyers, a general law for promoting enclosures was drawn up, and by care and scrutiny was rendered so unexceptionable, that it passed the House of Commons with little opposition. Had the measure been finally successful, employment would have been given to many thousands of the poorer classes, and the chance of future scarcities materially diminished. But it had a mass of prejudices to contend against, in the shape alike of private interests and stubborn time-rooted prejudices; and, through the exertions of the Lord Chancellor Loughborough, an extinguisher was put upon it in the House of Lords. At a subsequent period, however, under the administration of Lord Sidmouth, Sir John succeeded in carrying through a bill of great importance to the object in view. The discussions on these public measures served also to stimulate general curiosity to an examination of the subject, and the consequence was the bringing in of a multitude of private bills, by which the cultivation of the country was very considerably extended.

* *Vide* "The History of the British Revenue, from the earliest times to the Peace of Amiens, by the Right Honourable Sir John Sinclair." Third edition, vol. ii. pp. 287 and 336.

In a preceding part of this memoir, we mentioned, that, as early as 1788, Sir John Sinclair had acquired considerable reputation as a writer on finance, by a pamphlet which he then published, in opposition to the gloomy views promulgated by Lord Stair, Dr Price, and others. This subject he afterwards followed out in his "Review of the Financial Administration of the Right Honourable William Pitt;" to which an Appendix was added in 1789, and a third part in 1790. In 1803, the whole of Sir John's lucubrations on these and collateral subjects was collected into an elaborate work, in three octavo volumes, under the title of a "History of the Public Revenue of the British Empire, containing an Account of the Public Income and Expenditure, from the remotest periods recorded in history to Michaelmas 1802." This work excited a great deal of attention both at home and abroad; and a third edition of it, corrected and enlarged, appeared in 1804. It formed a kind of text-book for the study of the younger members of both Houses of Parliament, in a particularly interesting department of national policy. Necker bestowed the warmest encomiums upon it, and his opinion was worth something, having both thought and written much on the same subject; and such was the admiration of Mirabeau, that, at one time, he had formed the plan of translating it into French. Marniere of Ham-
burgh, in his "Essay on Commercial Credit," refers to it again and again, not only as a model of composition in such investigations, but as a standard work, not likely ever to be superseded.*

* "L'Histoire du Revenu Public, et du crédit de la Grande Bretagne, par Sir John Sinclair, presente le vaste tableau de toutes les operations de finances, que le Gouvernement Anglois a faites depuis un siecle, dans le genre des emprunts, et dans celui des impositions; et l'auteur en demontre les avantages, on les inconveniens, sans se laisser jamais égarer par des idées systematiques, on des opinions de parti.

"La traduction de cet ouvrage manquoit à la France: il ne suffisoit même pas de la traduire; il étoit nécessaire, pour le rendre aussi utile, qu'il doit être de la continuer jusqu'à ce jour; et Sir John Sinclair, se bornant à présenter des exemples et des leçons de pratique, il falloit encore rapprocher, sous un même coup d'œil, les résultats des diverses operations, dont il donne le detail, et les comparer aux ressources qu'ont employées d'autres nations, pour établir, sur des bases certaines, les principes de la science des finances, et ne fonder jamais la théorie, que sur l'expérience."—*Essai sur le Crédit*

... We have stated that, in the course of years, circumstances occurred to interfere with the cordial intimacy which had long subsisted between Mr Pitt and Sir John Sinclair; and that the latter found himself obliged to declare a difference of opinion with regard to several points, both of the domestic and foreign policy of the minister; but he never allowed that circumstance to interfere with the high estimate of his talents which he had formed in the abstract, as may be made apparent from a review of that part of his history of the revenue, devoted to the account and examination of his financial administration. Indeed, in another of his works, Sir John has himself summed up the substance of these investigations. "Whether we consider," he says, "in reference to this period, the immense sums levied by the various taxes—the greatness of the public expenditure—the magnitude of the loans borrowed—or the variety of new measures which were brought forward, it is an era which certainly contains more interesting and extraordinary particulars connected with questions of revenue than ever occurred in the annals of any other country, more especially during so short a period; and though, in many respects, the measures which the minister proposed might be questioned, yet it was impossible not to admire the splendid talents that produced them, and the superior powers of eloquence, and dexterity in debate, with which they were defended. Mr Pitt was thus enabled to overcome difficulties, from which most other men would have shrunk."*

To two of the great questions propounded at that time, the income-tax, and the redemption of the land-tax, Sir John paid great attention, and entered on their consideration in Parliament with his accustomed energy and zeal, as may be seen from his speeches on these occasions, printed in the History of the Revenue.† In these, it will be observed, that he was decidedly of opinion that no revenue adequate to the necessities of the

Commercial, considéré comme moyen de Circulation.—Hambourg et à Paris. An. 1801.

* "Correspondence and Reminiscences, vol. i. p. 316."

† *Vide* vol. ii. p. 232 and 266. These speeches were at the time published separately. "Alarm to Landholders; or the consequence of the Bill for the Redemption of the Land Tax," 1798, 8vo. And "Speech on the Bill for imposing a Tax on Income," 1798, 8vo. London.

times could have been raised, without having had recourse to the restriction on the banks, and relieving the nation from the oppression of a metallic currency. On this deeply agitated and still much disputed question, it is not our purpose here to enter—and indeed it would be foreign to the end and aim of this memoir. Suffice it to say, that the views entertained by Sir John on the expediency of banishing metals again from the employment to which, during a less enlightened period, they had been so advantageously directed, and to substitute paper in their stead, were in a great measure supported and strengthened by Mr Ricardo, in his proposals for an economical and secure currency.*

Ample confirmation was, however, given to a great part of Sir John Sinclair's prognostications, when trial was made of a paper circulation in 1797,—that gloomiest and most appalling crisis of our whole national history, when we had rebellion pervading Ireland; a foreign war, in prosecuting which our allies, whose cause we were mainly maintaining, were, one after another, deserting us; the navy in a state of mutiny; the funds sunk beyond all precedent; and even the Bank of England necessitated to crave protection. By the expedient proposed, the nation arose from its threatened ruin, and triumphed ultimately over all its difficulties. A new impetus was imparted to the productive powers of the country, and, instead of a national insolvency, Great Britain was enabled to subsidize all the nations of the Continent. That this resource was found admirably adapted to suit the pressing exigencies of the moment, admits not of doubt—as the plan was proved by the practice. Sir John, however, maintained, that the continuance of the system, with improvements of which it was susceptible, was alone requisite to render this country the greatest and happiest that ever existed;† but the Committees of both Houses, appointed to investigate the subject, were far from being so sanguine, and came to opposite conclusions. It has for the present been accordingly set at rest, although Sir John considered that the following important points have been hitherto left untouched and un-

* *Vide* "Proposals," p. 24.

† Sir John Sinclair's Correspondence, vol. I. p. 317.

investigated,—the expenses of coinage since the Revolution, which, with accumulated interest, would now amount to many millions,—the pecuniary advantages derivable from a paper circulation by taxation of bank-notes,—and the borrowing of large sums from the bank at low interest. He also queried, whether, by drawing gold and silver from other countries, and thereby impoverishing them, we do not in a great measure disable them from purchasing our commodities? Whether, by establishing a paper circulation, we would not derive advantages of inestimable value, through the medium of exchange? And, whether, if a metallic currency was deemed quite necessary, it would not be essentially beneficial to the public that the standard price should be increased, at least in proportion to former augmentations; the high price of the precious metals uniformly tending to national prosperity, by promoting industry, and raising the value of commodities?

As connected with this topic, and before leaving it, we shall briefly give Sir John Sinclair's opinions on another subject of immense national importance, and regarding which public opinion seems to be equally divided,—we allude to the principles which ought to regulate commerce. In opposition to the doctrines of Mr Huskisson and others, who held, that it is for the interest of every country to buy, at the cheapest market, all the goods it requires, and even to give encouragement, on this ground, to the importation of foreign goods, however destructive to our domestic industry, Sir John maintained, that the grand object ought to be the securing a home market for our own people;—to see that our own countrymen were fully employed, well fed, well clothed, well housed, and rendered as comfortable as their circumstances and situations in life admitted of;—to encourage exports, and to discourage the importation from foreign nations of all such goods as can be supplied by home growth or manufacture. Regarding a Nation as a political community, associated together for mutual advantages, he considered it inconsistent with the nature of such a union, that the individuals composing it should be entitled to disregard the general interest, by promoting the industry of countries with which they are quite unconnected. At all events, he considered the general principle of free trade as philosophically incorrect,

unless it was acceded to by all nations without reserve, and the balance be in favour of that which retained its restrictions. Sir John agreed that the system might be applicable to a trading town like *Hamburgh* ; but that, to a nation like *Great Britain*, which, although extensively engaged in manufactures and commerce, yet certainly derives its chief prosperity from its power to supply itself with food, and other essential articles from its own resources, the application was hazardous in the extreme ;—as he considered it an axiom in politics “ That no country can be happy at home, or powerful abroad, unless it be independent of other countries for circulation and sustenance.”

As a proof that the views of Sir John Sinclair were of the most philanthropic kind, he carried on a correspondence with the leading agriculturists, not only of the Continent of Europe, but even of America ; and, from all quarters sought not only to obtain, but in all quarters to disseminate, truly useful knowledge. His principal correspondents in France at this time were *M. Tessier*, Member of the National Institute for the Sciences and Rural Economy, *M. de Lasteyrie*, and *L. Silvestre*, Secretary to the Royal and Central Society of Agriculture ; in Prussia, Count *Hertsberg*, the Ex Prime Minister ; in Saxony, Count *Detler D'Einsiedel*, Director of the Dresden Agricultural Society ; and in America, General *Washington*, Dr *Rush*, Mr *Adams*, Mr *Jefferson*, Mr *Jay*, and Count *Rumford*. His correspondence with *Washington* is peculiarly interesting, and reflects an additional lustre on the memory of that truly great and good man.

It would appear that, in the spring of 1796, Sir John entertained the most gloomy apprehensions of the state of public affairs of Britain, and began to fear,—seeing that the arms of France had spread dismay over the Continent,—that we could not, single-handed, withstand the struggle. The friendship which had originally subsisted between Mr *Pitt* and him, had, as we have mentioned, from various circumstances cooled down into a mere interchange of civilities : and even then these were at length so far forgotten, that a feeling arose between them, in some degree savouring of personal animosity. Of many parts of the policy then pursued he had great misgivings ; and, for a while, he began seriously to think of looking out for an asylum

for his family beyond the Atlantic. With this view he was induced to apply for information to General Washington; and the result was a communication of great value from the latter, concisely detailing the prices of land, degree of cultivation, healthiness, and other advantages or disadvantages of the different States, and concluding with his partiality for the districts which skirt the waters of the Potomac.* The *amor patriæ*, however, at length prevailed; and Sir John determined to abide by the fortunes of his fatherland, whose commercial interests and agricultural prosperity he had so deeply studied, and had so much at heart; in the hopes that the storm might blow past, and that better days might yet shine upon it. Nor were these hopes frustrated. He lived to walk over the plain of Waterloo, after it had been immortalized by the last grand defeat of Napoleon. We should mention that this passing design of American emigration was entertained, before Sir John Sinclair's suggestion of the issue of Exchequer bills, or the establishment of the Board of Agriculture—measures from both of which the nation derived so much benefit. In 1797, when it was proposed in Parliament to give the subscribers to what was called "the Loyalty Loan," a long annuity of seven and sixpence *per cent.* Sir John successfully opposed the measure, after a first division in its favour had taken place; and thereby caused a saving to the country of more than half a million Sterling.

In 1799, Sir John, actuated by the same unwearied zeal to benefit mankind, however disproportioned in some instances, the means he proposed might seem to the end in view to those of a less ardent temperament, published his "Proposals for establishing a Tontine Society for ascertaining the principles of Agricultural Improvement." We are not aware that the scheme was ever practically adopted.

It is not much to be wondered at, if exertions so varied and extensive as we have enumerated, and unremittingly pursued through a long sequence of years, should at length have shewn their effects on any constitution, however originally free from any taint either of debility or disease. About the year 1797 Sir John began to suffer from the effects of this over-exertion,

* For this curious and valuable document, vide correspondence of Sir John Sinclair, vol. ii. p. 9-15.

which, although they did not shew themselves in any specific form, yet had induced a weak and enervated state of the system; and to his enthusiastic temperament, it was a misery to find, that he was almost unequal to the task of managing his private affairs—pursuing useful inquiries—or following out those political investigations, which the contemporary aspect of civil society seemed to demand. From the decay of his own health, he was led to the consideration of the subject in general, and was much struck in pursuing his statistical observations, by the fact, that so few of the numbers of mankind born, attain any extent of years, even in the healthiest climates; and that, even when life is prolonged, it is to so many, little less than a burden from the embitterments of disease. This led him into a course of reading on the subject, and the result was a pamphlet in quarto, published in 1803, entitled “Hints on Longevity.”* In the same year, Sir John collected his *Essays on*

* The great object of this pamphlet was to point out the path to longevity by shewing the most secure means for the preservation of health—that, being the grand aim in view, and longevity only a necessary consequence. Sir Adam Fergusson of Kilkerran, to whom Sir John had presented a copy, on its publication, seems to have misconstrued this, and imagined that Longevity, considered *per se*, was the object in view. Keeping this in view, we cannot resist quoting part of his letter of thanks to Sir John, as a specimen of spirited and elegant epistolary composition.

“With regard to the subject of the pamphlet,” he says, “with which you favoured me, *Longevity*, it is certainly one, which, considered as a point of natural history, is curious in itself, and deserving of investigation. As a political problem, I confess myself not to be sanguine in my hopes, of its even being brought the length of being attended with much practical utility. In the present advanced state of our knowledge of the globe, we have opportunities of seeing man in every stage and condition, from the savage in the wood, to society in its highest state of improvement; and, amidst all that diversity, I have not observed any marked diversity in the duration of human life. In every part of the earth, and from the time of the Patriarch David, to this day, three score and ten years seem to be nearly the limit of active life; and the comparatively few examples of men, who have lived ten, twenty, or even thirty years more, seem only to be such deviations from the usual course of nature, as must be expected in all cases of an average calculation. Besides, how few of these extraordinary circumstances of prolonged life, have been of any consequence to the world, or to the country to which they belonged? Mere existence, of whatever consequence it may be supposed to be to the individual, is of none to the world, if the individual, whose life is so prolonged, can neither, by his bodily labour profit his country, by

miscellaneous subjects, and published them together in an octavo volume. They are on a variety of topics, political, statistical, and agricultural; and, as may be supposed, of different degrees in value and importance.

In the pursuance of his investigations at this time on the subject of Health and Longevity, Sir John was in correspondence with Dr Currie of Liverpool, the distinguished biographer of Robert Burns, and himself a medical writer of high repute; the Chevalier Edelcrantz of Sweden; the Duke of Argyll; and Sir Alexander Ramsay of Balmain, and others.

The improvements in Caithness were at this time occupying also a considerable share of Sir John's attention, and he was in correspondence with Mr Dempster of Dunnichen, on the plan which that gentleman had introduced of sending fish in ice to the London market from the Tay Fisheries *, and on his introduc-

the exertions of his mind improve it, or by the production of children add to its population. If we can quote a Mutius Scævola, who, as I recollect, at the age of ninety, when rendered blind by age, sat in his hall, and gave advice gratis to all who came to consult him upon the civil law, and was called the oracle of Rome, how few instances of extreme old age have been any thing else, than instances of weak impaired infirmity;—how few of any advantage to mankind? But I admit, that if human life can, by any general methods, learned from experience, be prolonged, the presumption is, that the melioration of health will probably accompany it. It is certainly an inquiry, therefore, not to be neglected."

Correspondence of Sir John Sinclair, vol. i. p. 299-300.

* "One day," says Mr Dempster, "about the year 1784 or 1785, Mr Alexander Dalrymple, a faithful servant to the East India Company, and I, were shewn into one of the waiting rooms at the East India House, Leadenhall Street. During our attendance there, among other interesting matters regarding his voyages, Mr Dalrymple told me the coasts of China abounded with snow houses. That the fishers of China carried snow in their boats, and by means thereof, were able, in the heat of summer, to convey fresh sea fish into the very interior parts of China. I took pen and ink, and on the spot wrote an account of this conversation to Mr Richardson, who, as well as others, has been in the practice, ever since, of conveying salmon in ice from the river Tay to London, and from Aberdeen, Montrose, and Inverness, voyages of 300, 600, and 700 miles. In Mr Richardson I found a very grateful correspondent, for soon afterwards I received, on a new year's day, a letter from him, containing a draft on his banker for L. 200, to purchase a piece of plate for Mrs Dempster, and every year since the discovery, one of the finest Tay salmon is conveyed to me monthly, and free from all expense, by that gentleman's order, during the whole of the fishing season." Correspondence, vol. i. p. 360.

tion of the cotton manufactures into the West of Scotland, with the important discoveries which had been made by Arkwright.* He had also the scheme of a company in contemplation, for the planting of waste lands, which he thought would eventually turn out well for the subscribers. A communication to Mr Dempster on this subject has, we fear, not been preserved; but, in answer, the following advice is given. "Your planting project ought to be for 60 or 100 years.† Every solid foot of wood that stands till that time will be worth one shilling. Fifty trees *per acre* at least may stand till that age, and each contain at least fifty solid feet of timber. This, besides all the intermediate profits from thinnings of less age, would yield the company L. 150 per acre, for what may be planted by contract for L. 4 or L. 5."‡ In the mean time, Sir John had the gratification of knowing, that many of the innovations he had introduced into the northern part of the kingdom, were proving sources of national prosperity. Unlimited success had attended the establishment of the British Wool Society, and the value of many properties had been thence raised to a degree never contemplated even by the most sanguine. We have already mentioned that the estate of Langwell, which he himself bought for L. 8000, was sold for L. 40,000. Another which did not yield L. 300 per annum previous to the introduction of sheep, was afterwards sold for L. 50,000; and the estate of Reay, which formerly was let at a rental of from L. 1200 to L. 1500 per annum, brought the enormous price of L. 800,000.

It had been most judiciously determined on, at the establishment of the Board of Agriculture, that political or party feelings should in no instance, or in any degree, be allowed to interfere with the appointment of new members, who were to be selected

* For a most interesting description of the discoveries and improvements in the cotton manufacture, vide Blackwood's Magazine for March 1836. The article is pregnant with the most valuable information on the subject. It also appears that Arkwright was much more indebted to the more original mind of Samuel Crompton than is generally believed.

† See afterwards a very different opinion expressed on this subject, and that wood, as a pecuniary speculation, should be cut down every twenty-five years.

‡ Correspondence, vol. i. p. 363.

from amongst the most intelligent proprietors in the principal districts of the kingdom. Sir John was accordingly induced to nominate several eminent characters, whose political tenets differed widely from his own, on account of their known zeal for agricultural improvements. Among these were the Duke of Bedford and Mr Coke of Norfolk. The sheep-shearing festival had succeeded so well in Scotland, and seemed so likely to produce advantageous results, by creating competition on a subject of great rural importance, that both his Grace and Mr Coke, as well as that distinguished patron of husbandry Mr Curwen, resolved to institute similar meetings at Woburn, Holkham, and Workington. At each of these places, these festivals, which were continued for a succession of years, were well attended, and proved eminently useful. The meetings at Holkham were particularly distinguished, not only from the immense numbers who assembled, but from the variety of subjects brought under their consideration.

Taking into view how little comparatively any individual, however zealous and well informed, is able of himself to effect, Sir John was strongly impressed with the idea that the scheme of experimental farms might greatly tend to bring agriculture to comparative perfection. Indeed he regarded the plan as so thoroughly interwoven with the national interests, that the trial should be instituted either solely or at least partly at the public expense. So warm was the interest on this subject created at the time, from the attention which the Agricultural Board had excited with regard to every thing concerning husbandry, that, had not the treaty of Amiens been broken, and war again involved the country, there can be little doubt that the experiment would have been tried on an extensive scale, even by private subscription. There is also reason to believe, from the report made to the National Institute of France on the subject, that it would also have been there carried into effect, had not the same untoward circumstances drawn away public attention from all pacific considerations.

By an order from the French government, M. Otto, the Ambassador in London, applied to Sir John Sinclair for a list of such works relating to Agriculture, as were most likely to pro-

mote the internal improvement of that country; and, in doing so, Sir John took the opportunity of inclosing some copies of his plan for establishing experimental farms, together with some plans of circular cottages, and of a village peculiarly calculated for the accommodation and comfort of artizans in the country. These plans were presented by the Government to the National Institute, which appointed two of its most distinguished members Messieurs Tessier and Cels, to examine and report thereupon, which they did in a manner highly creditable to themselves, and expressive of the most enthusiastic admiration of the exertions which Sir John Sinclair had made in the general cause of humanity.* After entering at length into the details of the scheme proposed, they go on to say, "Instead of making extracts from, we could wish to copy entirely, on account of its utility, Sir John Sinclair's memorial. We think as he does on the subject of rural establishments. We have already declared our opinion in this respect, in this report. Our Government, we ought to hope, in receiving our observations on this head, will not neglect such a source of public prosperity."

In setting forth his plan for experimental farms, Sir John commenced with answering the objections of those who thought that a certain portion of land consecrated to experiments, is not requisite for the advancement of rural economy; and who believed that all which is really useful might be best accomplished by individuals guided by their own enterprise. He shewed that, in the latter way, matters could only be managed on a small, and probably not on a very scientific plan, and might prove, however ingeniously regulated, and in whatever degree successful, extremely hurtful to the pecuniary interests of those who embarked in them. Indeed all agricultural writers of the time, who raised their views from private speculation to look upon agriculture in the light of a science, were at one with Sir John in the matter; and Mr Arthur Young, Mr

* *Vide* "Mémoires présentés à l'Institut des Sciences, Lettres et Arts; par divers Savans. Et lus dans les Assemblées des Sciences Mathématiques et Physiques. Tome Premier. Paris: Baudouin, Imprimeur de l'Institut 1806. The leading article is entitled, "Projet d'un plan, pour établir des fermes expérimentales, et pour fixer les principes des progrès de l'Agriculture: Par Sir John Sinclair, Bart. &c. &c." Lu le 11 Messidor, An. 8.

Marshall, Mr Home, and others, considered it almost indispensable for the progress of a department of useful knowledge which had been grievously neglected as to its proper mode of cultivation, that experimental establishments should be tried in every great department of the empire; by the comparison of whose separate operations, certain fixed principles regarding the practice of husbandry might be obtained.

In the same way, and for nearly the same reasons, Sir John was of opinion that the plantation of waste lands by an association for the purpose, would not only be of national advantage, but would ultimately prove a lucrative speculation to those who engaged in it. The distant prospect of remuneration and profit, more especially when we consider the extent of surface operated upon by the law of entail, must ever in a great measure deter those from planting, who, from the chances of longevity, can see little likelihood of their ever reaping any equivalent reward for their outlay; but this objection has little weight with reference to a society, the members of which, in taking shares, may do so, as a plan of accumulating future capital, less for their individual uses than for the benefit of their families. Sir John proposed that the trees should be sold at the end of thirty years; and, according to his calculations, a most handsome remuneration would be afforded to the shareholders, making all allowances for expenses and the compound interest of capital.

After a minute examination by the French Institute, of Sir John Sinclair's *Memoir on Experimental Farms and Planting*, a Report was given in to the class by Messieurs Tessier and Cels, and afterwards approved of and signed by Cuvier, the secretary.

1. That conformably to the wish of Sir John Sinclair, the manuscript which he has sent shall be printed; 2. That M. Otto be written to, to thank Sir John Sinclair, M. P. &c. in Britain, for the manuscript which he has sent to the Institute; 3. That a printed copy of this manuscript shall be sent to each of them; and, 4. That the Secretary of Rural Economy shall immediately present to the class a list of the works on rural economy requested by Sir John Sinclair."

That the services of Sir John Sinclair in the cause of humanity were correctly estimated in France, is evident not only by the Report submitted to and approved of by the Institute, but

much more generally, as will be seen by the following extracts, translated from the eleventh number of the *Decade Philosophique, Littéraire et Politique*, published in 1800.—“Sir John Sinclair is a man devoted to the public good, and particularly to the prosperity of agriculture. By dint of zeal and perseverance, he obtained the establishment of a Board of Agriculture by the English Parliament, the invaluable works of which will have for their immediate result a Statistical Account of Great Britain, such as no other nation is possessed of.

“ Besides the funds appropriated to this purpose by Government, Sir John Sinclair has spent 25,000 francs (L. 1000 Sterling) *per annum* out of his own private income. But his philanthropy does not confine itself to the British isles. He persuaded Washington to adopt agricultural establishments of the same kind in the United States; and he has lately addressed to the National Institute of France, his plan of experimental farms, at the same time expressing his desire that it should be printed under the auspices of that Society.”

After detailing the resolutions of the Institute on the subject, the writer thus concludes:—“ The object which Sir John Sinclair has in view by experimental farms, is to ascertain useful facts in the progress of agriculture, and to publish them; to throw new light on the subject, and to persuade by example; in short, by such means, the best methods, which are now scattered over the face of the country, like the fertile seeds of flowers, will soon be more generally known and established.”

This same plan of Sir John for establishing experimental farms, and erecting cottages on the most advantageous system, having been circulated throughout Germany, Bottiger, one of the most celebrated of the savans of that country, took up the subject in the *Jena Universal Literary Gazette* for June 1801,* and thus expresses himself regarding the plan and its author.

“ The annexed plan of a country village is inserted here, chiefly with a view to bring once more to my countrymen’s recollection, one of the most active promoters of agriculture, and one of the noblest philanthropists in Europe, Sir John Sinclair, the Scotch baronet, and to erect a durable monument for him

* *Vide* vol. ii. p. 11.

in this Gazette. Our readers are already acquainted with the statesman and economist whose activity is only equalled by the propriety of its objects!" After alluding to the disagreements which had taken place between Mr Pitt and Sir John Sinclair, and of the silly attempts which had been made by political partizans to turn some philanthropic plans of the latter into unmerited ridicule, as well in Germany as in London, M. Bottiger proceeds:—"Let them answer, however, the questions stated in our *Agricultural Magazine*, No. 5. To whom is Scotland indebted for the attempt to purify her language? Who has exhibited the English finances in the clearest manner, and on the surest basis? Who has erected for Europe a model of statistical information, and carried it the length of twenty volumes, in the face of all difficulties? Who has created a centre for Great Britain's best and dearest interests, her agricultural produce? Who has provided the means of improvement for a chief staple of England, her wool? Who has toiled most earnestly for converting waste lands into fertile fields, and inclosing dreary commons? And who has essentially opposed the inveteracy of bad habits, and the indolence of traditionary customs, even among our farmers? To whom do we owe this and more? All this, we must own, we owe to Sir John Sinclair, and almost to him alone?"

We ought to have mentioned that, in 1795, Sir John drew up, with his own hand, for the Board of Agriculture, an Account of the Northern Districts of Scotland, the counties of Ross, Sutherland, Caithness, Orkney, and Shetland. These original surveys were printed but not published, being only considered as the ground-work for the corrected reports of the several counties of England and Scotland, which were afterwards brought out under the auspices of the Board. Previous to his quitting the Presidency of the Board, these original surveys were completed in ten volumes quarto. These were distributed for marginal annotations,—an immense number of which were received from an unlimited number of individuals, with all of whom it was necessary to carry on a frequent correspondence. We have before mentioned that the work, when completed, comprehended eighty octavo volumes.

There can be adduced no better proof of the celebrity which

these exertions for the good of mankind had attained on the Continent of Europe and in America, even previous to the end of the last century, than the simple enumeration of the diplomas sent to Sir John Sinclair by different societies, who considered themselves alike honouring and honoured by his admission into their ranks. On the 11th January 1787, he was admitted a member of the Royal Society of Agriculture at Paris; on the 4th July 1792, of the Society for the Improvement of Agriculture in Russia; and, on 31st December of the same year, of the Agricultural Society of Zell in Germany. On the 25th of January 1794, he received his diploma from the Royal Academy of Berlin; and, on 23d March of the same year, from the Brandenburg Economical Society. On the 24th December 1795, he was elected a member of the Dublin Society. On the 26th October 1796, the Royal Society of Stockholm enrolled him among its Fellows; and its example was followed, on the 8th June 1797, by the Florentine Agricultural Society; on the 29th September by the American Society of Arts and Sciences; and, on the 10th October, by the Leipsic Agricultural Society. Sir John was at the same period a member of the Royal Societies of London and Edinburgh, as also of the Antiquarian Society of London, of the Cork Institution, and the Medical Society of Aberdeen.

(To be concluded in next Number.)

ON HEDGE-BIRDS, WHICH ARE ALLEGED TO BE MORE OR LESS
DESTRUCTIVE TO FIELD OR GARDEN CROPS.

IN making a tour in the north of Ireland, towards the Giant's Causeway, about twenty years ago, the want of hedges struck me as a remarkable characteristic of the face of the country, though it did not, as I afterwards found, appear quite so naked in this respect, as the extended corn-fields of Picardy, or the broad and beautiful holms on the Rhine, through which I have journeyed for days together, without seeing the semblance of a field-hedge, to break the sameness of the level landscape, or afford a resting-place for a flight of sparrows, or a nest-nook for a linnet or a chaffinch. On the Continent, indeed, there are

trees in plenty—generally fruit-trees—in rows all along the roads, and planted at wide intervals among the corn,

Like giants that in silence stand,
To sentinel enchanted land ;

and in this there is no resemblance to the treeless as well as hedgeless nakedness, that struck me so much on my first visit to Ireland, contrasted with the beautiful woods and fine hawthorn hedges of my native country.

As there are good reasons for forming hedges in Scotland and England, where indeed they become a serious item of agricultural expense, either to the landlord or the tenant ; so there are, no doubt, equally or nearly as good reasons for the want of hedges in Ireland and on the Continent. And we ought never to condemn any practice hastily, without knowing all the particulars that led to its adoption,—of which the following is so striking an illustration, as to be well worth repeating. “ Many years ago,” says the sensible writer, “ on looking over a farm in Derbyshire, in company with the occupier, we went to see his plough at work breaking up a piece of lea ground. I at once condemned the farmer’s practice of yoking five strong horses *at length*, and told him I thought two such horses yoked *a-breast* would answer the same purpose. The good-humoured farmer, Englishman-like, did not seem offended by my petulance, but coolly answered, ‘ They are not horses, they are mares.’ I laughed at the distinction, but he explained himself in a very satisfactory manner, and to my great confusion. He said, ‘ I have a cheese-dairy, and keep a large stock of cows ; more than half my farm is in permanent grass for cow pasture and mowing for hay ; the remainder is under a regular rotation of arable culture. I keep four working mares, and one to ride and draw occasionally. I might do with fewer at some seasons, but I want so many in seed-time, in hay and corn-harvest, and for working the turnip fallow. Three of the mares you now see are in foal, and I expect to make L.70 or L.80 of their produce when a year and a half old, and that is about my annual return. The mares are now near their time of foaling, easy work does them good, and they are less liable to injury worked *at length*, than if yoked *a-breast*. Neither is there so much loss of power as you imagine. The hill where they are ploughing is steep, and the

lea tough, yet they make a furrow both ways; whereas a pair of horses, yoke them as you will, could only draw down hill, and slade the plough up without one.' I thought the explanation so satisfactory, and the reasoning so sound, that I immediately acknowledged my error, and apologised accordingly. That was a good lesson to me. It taught me to be more careful in future of censuring without investigation." * On the same principles we should be cautious of blaming our neighbours for not planting hedges.

On the Continent, hedges or fences of any sort are by no means so indispensable as in this country, in consequence of the different mode pursued there of feeding cattle. In the hedgeless districts of France and Germany, there is no grazing,—no feeding of live-stock out of doors,—no meadows covered with sleek well fed cattle, as in Holland,—all the farmers' live-stock being closely confined in stables, out of which they are so rarely seen, that a diligence-tourist might ride hundreds of miles without suspecting the existence of a cow or a sheep in his whole route. In Normandy, indeed, they frequently feed off tares or clover by tethering the cows in shifts; and in Picardy, I have occasionally seen a boy or a girl leading a cow with a rope, to graze by the road-sides, but in Germany never; for the cottager, who may have only one cow, prefers cutting the grass from the road-side or in the woods with a bill-hook, and carrying it home to the byre.

The same system of stall-feeding is pursued in the most extensive concerns, and hence it is rare to see natural grass, except on the hills or in the glades of forests, while there is always, in the arable grounds, considerable breadth of clover or turnips or both. Between Heidelberg and Carlsruhe I observed, in the autumn of 1832, a uniform and excellent crop of broad-cast turnips, all of course intended for stall-feeding, extending from seven to ten miles along the road, with scarcely a furrow of distinction, much less a hedge or a ditch to serve as a landmark of proprietorship or tenancy. Under such circumstances, consequently, so far as cattle are concerned, hedges or any other fences could be of no use.

The case is different in Ireland, where grazing is practised,

* Quart. Journ. of Agricult. v. 36.

but the fences are all turf or stones, or both, with sometimes a few straggling furze bushes along the coping, though whether these were ever continuous, so as to merit the name of a hedge, appears in most cases to be more than doubtful. These furze bushes, as they commonly appear in the Irish fences, can certainly serve none of the purposes of a hedge, no more than the few feet of nicely clipt hawthorn which a worthy Englishman, the late Rev. Mr King of Bandon, shewed me in 1819, in his garden, as the only fair specimen of an English hedge in the south of Ireland,—planted indeed by himself, in reminiscence of Old England.

On a market-day at Ballymena (I think it was) in Antrim, I mingled with the farmers to learn something of their modes of management, and amongst other questions, I asked why they had no hedges around their fields, when, together with economical considerations, influenced in most cases by the nature of their tenures, they all agreed in reprobating hedges, which they said were of more advantage to the sparrow than to the farmer. The same notion of hedges affording harbour for birds destructive to corn, is mentioned by the Abbé Rozier* as prevalent in France; and it is probably more or less diffused in all countries, though for want of precise knowledge, it is often considered a much greater evil than it really is, even where the hedges are, as it should seem, constructed on very purpose to cover an unprofitable breadth of ground with all sorts of briars, brambles, and brushwood, as is but too commonly the case in the vicinity of London, and elsewhere in England.

Looking at hedges, then, in this point of view, it may not be altogether without use or interest, to investigate the nature and the probable extent of the injuries which they may or may not occasion, by harbouring birds of different species. For this purpose, it will be indispensable to distinguish the sorts of birds most usually frequenting hedges, at seasons when crops may receive injury; and, what is of no less importance for understanding the subject, to investigate carefully the sorts of food eaten by each species. It would be as preposterous, indeed, to accuse the wrens and redbreasts about a garden, of feeding on the flowers or the pot-herbs; or the lapwings or cuckoo on a farm,

* *Cours d'Agriculture*, article HAYE.

of grubbing up the young wheat or devouring the seed of newly sown barley, merely because they are found there, as it would be to accuse a hare of hunting and worrying sheep, or a fox of stealing the nest-straw of the poultry-house for a similar reason. Yet are accusations equally erroneous very commonly made by farmers and gardeners, very well informed in other respects; but unacquainted with their habits and peculiar food, against the wild birds found in fields and gardens.

An excellent observer, the Rev. W. Bree, has well remarked, that "when any mischief is done in the garden, the orchard, the plantation, or on the farm, we are very apt too hastily to lay the blame on such animals as may happen, in pursuance of their usual habits, to be occupied in or near the spot where the mischief takes place. Frogs and toads have, before now, been accused of eating the strawberries, because they are often met with among the strawberry beds." Proceeding on similar mistaken notions, an orchardist of Pontefract, as we are informed by Major, in 1823, destroyed many lady-birds as injurious to his crops, because he found the crops injured and the lady-birds there; whereas it is not difficult to prove that lady-birds never touch any vegetable food, any more than frogs or toads devour strawberries. I had some lady-birds sent me from a distance, two or three years ago, by a gentleman who found them on his peach-trees, and fancied they were eating the leaves, to have my opinion of their destructive propensities!

As our subject naturally divides itself into three parts, inasmuch as birds are decidedly destructive, partially destructive, or not destructive at all, though alleged to be so, it will be convenient to treat the three kinds separately, beginning with the last, of whose habits and food gardeners and farmers (it is presumed) know much less than they do of the two first.

I. NON-DESTRUCTIVE HEDGE-BIRDS.—At the outset, it is necessary to remark, that many birds not in the least destructive to the ordinary crops of a farm, often commit considerable depredations in orchards and gardens, nay, the latter so far from being injurious to agricultural crops, may prove of no little service, as we shall afterwards see.

1. Insectivorous Hedge-Birds, which do not eat Fruits or Seeds.—The hedge-birds, which live exclusively on insects, and never touch fruits, much less seeds of any kind, are but few in number, and, like the larger carnivorous ani-

male, are thinly scattered, with rare exceptions live solitary, and do not assemble in flocks. It will not be requisite to mention each of these birds in systematic order, but I shall advert to the best known and most abundant species.

One of the most exclusively insect-eating birds, not uncommon in most parts of the empire, is the gold-crested wren (*Regulus cristatus*, Ray), the smallest of the birds of Europe, measuring only three inches and a half in length, including the tail, which is an inch and a quarter. It cannot be mistaken for any other bird, being of a greenish-yellow colour, while the common wren is rusty brown, with lighter bars and spots; and though the chaffinch and the hay-bird are yellowish-green, neither of these has the golden-yellow on the crown of the head, which at once distinguishes this pretty bird. A less conspicuous distinction is formed by two white bars, similar to those of the chaffinch, across the wings, caused by the greenish feathers of the wing-coverts being tipped with white.

The gold-crested wren seems to delight most in evergreen shrubs and trees, particularly the spruce fir and cedar, though it is often found where there are few of these, and, even where there are plenty, it never fails to make daily excursions along the hedges in the vicinity, flitting about through the thickest branches, and uttering its small tinkling chirp of *tee, tee, teehy*, at every change of its position. It is not in the least afraid of being approached, most probably owing to its being very near-sighted—a peculiarity of vision no doubt designed by Providence for enabling it the more readily to distinguish the minute insects on which it exclusively feeds. It may, indeed, be easily approached near enough to see its colours distinctly, or even to catch it with a fishing-rod tipped with bird-lime. In consequence of its minute size, it is rather impatient of cold; yet it does not appear to migrate, except perhaps very partially, even in Scotland, where it remains during the severest winters, one or more families of the tiny little creatures keeping each other warm in cold frosty nights, by huddling together as closely as possible under the thickest branches of a spruce or silver fir, or of a furze or ivy bush. They are said, however, to migrate from Shetland and the Orkneys. It is not a little singular, that though they stand hard frost out of doors, yet exposure to frost kills them when tame, as if the protection of a house rendered them less hardy. They are greatly more abundant in Scotland than in England, and in some districts where fir plantations have been made, they have multiplied prodigiously within my own remembrance.

No farmer, I should think, would be apt to accuse the gold-crested wren of injuring his crops; but when a gardener unacquainted with their habits and food, sees them flitting about among his espaliers, his wall-trees, or his rose-bushes, he will be apt to think they are busy eating the blossom buds, as some other birds are well known to do; while, on the contrary, they are doing him essential benefit, by picking up every straggling plant-louse (*Aphis*) and bud-weevil which they can meet with.

The species which come nearest to the gold-crest in appearance and habits, are the wood-wren (*Sylvia sibilatrix*, Bechstein), and the willow-wren or hay-bird (*Sylvia Fitis*, Bechstein), the latter well known in Scotland by the name of the *basket laddy*, given to it from its elegant form and pretty colouring.

The chiff-chaff (*Sylvia loquax*, Herbert), also ranks with these as an insect-eating bird, but is not sufficiently common to merit attention here. The hay-bird is only five inches and a quarter in length, the wood-wren a quarter of an inch more, and the chiff-chaff nearly half an inch less. All the three are greenish-yellow, darkest on the back and wings, and lightest on the breast and belly,—the young birds being much brighter in colour than the old ones, a circumstance not usual among birds. Some say the chiff-chaff remains with us all the year,—the other two are certainly birds of passage, arriving late in April or early in May, and announcing their arrival by their pleasing notes, those of the wood-wren being shrill, short, and hurried, accompanied by a peculiar shaking of the wings,—those of the hay-bird consist of a rather continuous, soft, plaintive warble. The hay-bird uniformly lines its snug little nest with a profusion of loose feathers; the wood-wren, on the contrary, never uses feathers, but lines neatly with hair.

The wood-wren is most frequently found among tall trees; and among "hedge-row elms," as Milton calls them, and other tall trees in hedges, it may occasionally be seen. The hay-bird, again, delights in small copsewood, and in what may well be termed copsewood hedges, so common in England; while it is no less common in shrubberies and gardens, often building in the strawberry-beds, for though it does not seem to care about human neighbourhoods, being found in the most wild and solitary places, it is by no means shy, and will not only allow itself to be approached, almost as near as the gold-crest, but will even make its way into greenhouses, and, when the windows are left open, into rooms, where plants are kept in pots.

The chief food of these three species consists of small flies or small caterpillars, such as roll up the leaves of trees and shrubs, and particularly the rose-leaf roller (*Loxotamia rosaria*) or "worm i' the bud," together with the whole of most destructive species of plant-lice (*Aphides*).^{*} Where the birds are plentiful, accordingly, they may prove of no little service to the farmer in thinning, on their first appearance, wheat-flies, the blue-dolphins, the hop-flies, and the turnip or the pea-plant lice. This is of great importance, for one of these insects killed at the time of their first appearance will prevent the breeding of several thousands. After the breeding has proceeded to the second and third generations, our little birds are too few in number, even with their voracious appetites, to keep them down. Yet with all this decided benefit, farmers unacquainted with their exclusively feeding on insects, are but too apt to class them without distinction among "birds," as if all birds fed alike, and were ready and eager to devour whatever crop they might find cultivated in the fields.

Gardeners are even more prejudiced, against the hay-bird in particular, than farmers usually are, and in some parts of England it is opprobriously termed the *cherry-chopper*, from a notion that it devours the cherries. That this bird is very frequently found on cherry-trees, is most true, and, if watched, it may be seen busily picking among the fruit, though, as it never eats fruit of any kind, it does not touch the cherries, but is in pursuit of the destructive cherry plant-louse, a species which is particularly injurious, and which commences its ravages on the cherry-leaves about the end of April, when the

^{*} Quart. Journ. Agricult. Sept. 1835, p. 197.

hay-bird arrives, as if Providence had ordered the insects to multiply at this season to supply the hay-birds with food. No more does the hay-bird ever taste one of the strawberries in the bed where it may have built its nest, nor the peas in the adjoining kitchen-garden, its bill indeed being too slender to bruise peas, and its gullet too narrow to swallow them unbruised, even were it inclined (as it assuredly is not) to attack them. White of Selborne, therefore, did not manifest his usual accuracy of observation, when he said, that the willow-wrens, meaning the hay-bird and chiff-chaff, are horrid pests in a garden, destroying the peas, cherries, and currants,—an opinion which he no doubt adopted without due examination from the gardeners. Had he ever procured tame ones, as I have had, and tried them, when very hungry, with cherries, currants, strawberries, and with green peas both raw and boiled, he would have soon had ocular demonstration that they would rather starve than eat fruit or seeds. So far, then, from persecuting and killing these birds, as gardeners so frequently do, every means should be taken to encourage them to breed by protecting their nests.

Mr Knapp correctly says of the hay-bird, that “he comes in company with his travelling friends, not as a partaker of their plunder, appearing never to abandon his appetite for insect food: the species may change with the season, but still it is animal: he glides about our rows of peas, peeps under the leaves of fruit-trees for aphides and moths, continuing this harmless pursuit until the cold mornings of autumn drive him to milder regions.”

There is little fear of the nests of the next species to be noticed being taken or destroyed, for the nightingale (*Motacilla lusciniæ*, Linnæus), conceals her nest so carefully that it is rarely found, even where the birds are most plentiful. Nightingales themselves being usually “in shadiest covert hid,” are seldom seen, and many persons spend their whole lives in the midst of hedges and copees where they abound, without knowing their appearance. The cock and hen differ little in size and colour, and are so like the female redstart, that the latter is often sold for a nightingale. Our northern readers who do not know the redstart, may be told, that, except in being a trifle larger, the nightingale is very like a redbreast in form and colour, with the exception of the breast, which instead of being orange is whitish, and the back rather more brown or rusty than the redbreast’s.]

The nightingale is not found in Ireland, in Cornwall, in Devonshire, in North Wales, nor in North Britain, seldom, indeed, farther north than Yorkshire, consequently the Scotch ballad of the Banks of the Dee, beginning

“ ‘Twas summer and softly the breezes were blowing,
And sweetly the nightingale sang from the tree,”

is in this respect erroneous. In the southern counties, the species abound, arriving in April, and frequenting thickets, hedges, thick brambles, tufted bushes near fields, and even gardens where there are many low flowering shrubs.

It is stated in some books, that besides insects, nightingales will eat berries and currants, but though they may certainly be taught to eat fruit, it is not natural to them, and they will rarely if ever touch it in a wild state, so that however numerous they may be, the gardener may rest assured they will do his crops no injury, while they will do him considerable service by

numbers of caterpillars and grubs, as well as the moths, butterflies, and beetles from which these are produced. Even if nightingales should, as we are convinced they do not, purloin a few currants, they repay them well by the loveliness of their song, in which they far excel all the other woodland songsters of Europe, and are only, it is said, surpassed by the mocking-bird of America.

There are three pretty birds termed chats—the whin-chat, the stone-chat, and the wheat-ear, which may in some sense be ranked as insectivorous hedge-birds, the stone-chat particularly, which is fond of hedge-rows. This, though the name is similar, is not the bird termed in Scotland the *stone-chacker*, this being the wheat-ear of the English writers. The male stone-chat is readily distinguished by having the head, throat, and tail of a deep black, the breast and belly reddish, while the female is brownish-black, with the throat black and spotted with whitish and reddish marks. The whin-chat, again, is not so gayly coloured, but may be distinguished by its general rust-red colour, and by a white line from the nostrils passing above the eyes as far as the ears. This species frequents cabbage-gardens and turnip-fields after the breeding season, and ought to be protected because it not only eats insects but small shell-snails, while it never touches fruits or seeds. The wheat-ear or stone-chacker (*Saricola emaniha*, Bechstein), which frequents corn-fields, building in the little heaps of stones gathered from the land, is equally beneficial in clearing the crops from insects, without levying any contribution for its services.

The wagtails, particularly the yellow one (*Motacilla flava*, Linnæus), may be observed in corn-fields as frequently as most species, though they are more usually seen running near drains and furrows than about the hedges. The wagtails do not touch fruits nor seeds, and feed wholly on insects, particularly gnats, midges, and other flies that tease cattle, and for the purpose of catching these insects, the wagtails are not afraid to run round cows in the pastures “close up to their noses,” as White correctly states, “and under their bellies, availing themselves of the flies that settle on their legs, and probably finding worms and grubs that are roused by the trampling of their feet.” Wagtails will, for the same reason, follow the plough to feed upon the worms and grubs turned up in the furrows, and in this way, no doubt, thousands of wire-worms and other destructive vermin are effectually destroyed.

The tree-pippit or titlark (*Anthus arboreus*, Bechstein), is another very common hedge-bird, which lives exclusively on insects. It is not the bird termed the *tilling* or *moss-cheeper* in Scotland, which is the meadow-pippit (*Anthus pratensis*, Bechstein); but this may also be seen on hedges, on the confines of moors, though it seems to like best to take to the bent or the open heath. These birds much more resemble the wagtails than the larks in their form and habits, though their colours are similar to the larks. They never hop with both legs like a sparrow, but when they walk or run, put one leg before the other like the wagtails, and like them also they move their tails up and down, but not quite so much,—a habit which the sky-larks and wood-larks are not observed to have.

In the autumn, when the pippits are preparing to depart for a warmer climate to winter in, they may be observed to be sometimes numerous (though they never congregate in flocks) in market-gardens and in cultivated fields,

particularly along the southern coast; though in no case do they commit depredations on fruits or seeds, but busily search after the autumnal hatches of caterpillars and grubs, or the smaller flies and beetles which they find among the herbage.

As the titlarks, chats, and wagtails, together with the dummock or hedge-sparrow, are more commonly selected as step-mothers by the cuckoo, who is well ascertained to build no nest, and never hatches her own eggs, it may be proper to mention here, that the cuckoo is exclusively an insect-eating hedge-bird. It is so shy and wary that it is not easily approached so as to be distinctly seen while sitting on a hedge or a tree, but it may frequently be seen on the wing, when it so much resembles the kestrel or sparrow-hawk, that the swallows and other small birds appear to mistake it, and buffet it with bill and wing till it again alights, when they leave it alone. Except from the popular saying in Scotland, that the cuckoo becomes hoarse, or ceases her monotonous note when she gets a bear-awn in her throat, I am not aware of this bird being accused of committing depredations on corn crops. The error (if error it be) may have arisen from the cuckoo becoming silent about the season that bear or barley comes into ear and shews its awns. As for the notion of the cuckoo ever feeding on the ears of barley, either green or ripe, it is certainly quite unfounded. Its chief food is the larger caterpillar, such as those of the buff-tip-moth, as well as the moths themselves, and butter-flies, dragon-flies, and the like, facts which have been repeatedly verified by opening the stomachs of cuckoos that have been shot. Both the cuckoo and its young being very voracious eaters, so as to be scarcely ever satisfied, the number of destructive insects which they devour must be very great; and hence they ought to be protected by the farmer and gardener, as ranking among their best friends.

The common fly-catcher (*Muscicapa griseola*, Linnaeus) is one of the most decidedly insectivorous of all our hedge-birds. It is nearly the size of the dummock or hedge-sparrow, and not unlike it in colour, being rather lighter, with a few whitish streaks on the plumage. I had one in a cage with a number of other soft-billed birds, but it could never be brought to touch any thing but insect or animal food, and uttered the most pitiful cries when a fly or a meal-worm was filched from it by any of the others. The fly-catcher differs considerably in his mode of hunting from several other species which take insects chiefly on the wing. Instead of keeping up a continuous flight like the swallow or the bat, the fly-catcher, like his fellow hedge-hunters the dragon-flies, chooses a station where he can take good observation of all the insects which may venture within his boundaries; generally the top of a gate-post, a stake in the hedge, a dead leafless branch, a tall stick in the middle of a grass plot, the projecting stone of building, or the naked spray of a tree. From such a station he will remain in constant activity the greater part of a summer's day, springing forth, catching a fly in the air, and returning to swallow it, capturing one moment and resting the next to prepare for another. White of Selborne says it hardly ever touches the ground; but this does not agree with my observation, for I have frequently seen fly-catchers dart down from their watch-post to seize some unlucky caterpillars that had crept into

view'; and another species, the pied fly-catcher, which I had in a room full of birds not caged, would dart down in a moment on any insect thrown on the floor. It may be as well to mention that the fly-catcher is not the only bird that springs up from a fixed station to take flies on the wing, it being the common practice of the chaffinch, the black redstart, and several other birds; while the nightingale and the red-breast dart down in the way just described to seize insects on the ground.

The flusher or lesser butcher-bird, (*Lanius Collurio*), popularly termed Jack Baker in the south, is larger than a redbreast, but smaller than a thrush, and is readily distinguished by the reddish-brown colour of the back. It is very common in the hedges in some localities, where it builds a neat and large nest. Its chief food consists of beetles and flies, particularly the breeze flies which tease cattle, and even wasps and bees, and hence it may be destructive to hive-bees; but this is the only damage it does to the farmer or gardener, for it never touches fruits or seeds. When it is pinched for insect food, it feeds on field mice, lizards, and small birds, transfixing them, as it does humble bees, on a thorn, and tearing them to pieces. In houses much infested with flies, a tame flusher is a useful pet, for, leaving it at large in a room, it will soon clear it of the flies, and if a thorn branch be given it to perch upon, it will carry the flies thither and impale them on a thorn before eating them. To these many other hedge-birds might be added, such as the night-jar, the sedge-bird, the wryneck, the creeper, and the bottle-tit, none of which are in the least destructive, while, from their feeding exclusively, or nearly so, on insects, they are of much service in diminishing the numbers of such as are injurious to field and garden crops.

2. *Insectivorous Hedge-Birds which partially eat Fruits or Seeds.*—The common wren, popularly termed the Kitty wren, or the Jenny wren, is the first bird which I shall notice under the present division. Its diminutive size, and its tail perked up as if it were trying to imitate a well-pleased dog, at once distinguish it from every other hedge-bird. Its habits are also somewhat peculiar, for though it flits up and down among the branches of a hedge, it rarely runs up and around the trunk of a tree like the creeper, (*Certhia familiaris*), nor does it usually get so high up as the tits (*Parus*), preferring the root branches and those which hang over water, where gnats and other night-moving aquatic insects lodge in the day time, overshadowed from the light. On these the wren banquets both in summer and winter, and may frequently be seen about hedges, barns, stables, farm-yards, walls, and piles of wood. It is said to eat small berries, such as those of the elder and small seeds, but it is certain none of these constitute its staple food at any season, and so long as it can find a gnat or a small beetle, it will rarely touch them. From its being a prolific breeder, and the young, though so small, being voracious eaters, the wren must tend greatly to keep down the numbers of several sorts of destructive insects, particularly in gardens and orchards.

The hedge-sparrow or dunnoek (*Accentor modularis*, Bechstein), although a much larger bird, is very similar in habits to the wren, and even bears some resemblance to it in its calls, and in the notes of its song. The common name of hedge-sparrow or dyke-sparrow is very inappropriate, inasmuch as it has little similarity to the sparrow, except perhaps in its sombre colours, and in

its being somewhat omnivorous, as indeed is almost indispensable to all wild birds that have to shift for their food throughout our British winters. The dunnock, however, is, by the form of its bill, distinctly an insectivorous bird, and any other food which it may be found to eat is rather accidental than otherwise. "When wild," says Dr Bechstein, "the great varieties of things which serve it for food prevent its ever being at a loss throughout the year. It is equally fond of small insects, and worms, and small seeds. In spring it feeds on flies, caterpillars, grubs, and maggots, which it seeks for in the hedges, bushes, and in the earth. In summer it feeds chiefly on caterpillars; in autumn on seeds of all kinds and elder-berries; and in winter, when the snow has covered all seeds, it has recourse to insects hid in the crevices and cracks of walls and trees."^a

On opening the stomachs of this species which have been accidentally killed, oats have been found along with other seeds; but this was in the winter time when their more natural food is scarce, and I do not believe that it ever eats a single grain of oats from the field in autumn, while insects are plentiful, or while berries may be procured. With respect to its depredations on gardens, these seem to be equally unimportant as its attacks upon oats, for though it would certainly not refuse a bunch of currants, provided there were no abundance of insects, yet it is not by any means a regular visitant in gardens, and prefers to hunt about among hedges and scattered low bushes in fields and commons. In winter it is more common in gardens, and when it cannot find gnats or beetles, half benumbed as they then are with the cold, it will look out for the smaller seeds, such as those of pimpernel, speedwell, lychnis, or sweetwilliams, which it may chance to find as weeds, or as ungathered in the flower border. The insects which it destroys must, I should think, most amply compensate for the slight loss it may occasion in picking a few chance currants or a head or two of flower-seeds; and, therefore, far from it being proper to kill this "sober suited" bird, whose simple but agreeable song is one amongst the earliest indications of the return of spring and fine weather, the gardener would do well to protect it and save its pretty blue eggs from the thoughtless plunder of bird-nesting school-boys. Mr Knapp is of opinion, that the dunnock and similar insectivorous birds, when they cannot procure insect-food in winter, feed on the seeds of mosses, such as the hygrometer moss, which abounds both on walls and by the edges of gravel walks; but, if it were so, the birds would sometime or other be observed searching for the capsules, though it is not said this was observed, and certainly has never been remarked by me in a long course of very minute observations of the habits of birds.

Next to the house-sparrow, the redbreast is perhaps the best known and most universally diffused bird in this country, where it abides through the winter, though on the Continent, as well as in the Orkney Islands, it is only a summer visitant like the nightingale or the blackcap in the south, and is seldom seen familiarly about houses, making acquaintance with cottages for the purpose of procuring a few crumbs of bread, when forage becomes scanty and precarious in the "woods and wilds" where it has spent the summer and

^a Bechstein's *Cage Birds*, p. 321.

reared its young. The habits of the redbreast, though so well known to every peasant, are very frequently misrepresented in books, and hence it is the less to be wondered at, that unfounded prejudices should exist against other species not so common as this universal favourite. It is said, for instance, that the redbreast always betakes itself to the woods in summer, and only comes near villages and farm-houses about the approach of winter. This has arisen from copying foreign observers, who are right so far as continental redbreasts are concerned, but wrong with respect to British redbreasts. "In summer," says Dr Bechstein, "they must be sought in woods; they return to us about the middle of March, and stop for a fortnight in the hedges, and then proceed to the woods. In October they return towards the bushes, which they busily search as they travel and proceed gradually to their destination. Some delay their departure till November, some will even remain here and there throughout the winter, but generally to their cost, as their life is usually sacrificed to these delays. Necessity then forces them to draw near to houses, dunghills, and stables."

Now, it is evident from these remarks of one of the most accurate and original of the Continental naturalists, that our British redbreasts have very different habits. As there are few or no detached farm-houses in most parts of the Continent, the farmers all congregating into villages or towns, for the sake of society, in peace and mutual protection during war, it may be thought that the redbreasts are deterred by the multitude of houses from approaching human neighbourhoods, while in Britain they learn sociality by degrees, first about detached cottages and farm-houses, which gradually embolden them to venture into villages and towns, and even into crowded cities, for they may be seen in the Temple Gardens and the squares in the very centre of London—a circumstance which must appear not a little surprising to Continental ornithologists. I have little doubt indeed of the fact, though I cannot prove it, that some of them even breed in such places as the Temple Gardens, it being far from true that they all retire to the woods during summer.

Although the redbreast may occasionally purloin a currant from the garden or an elderberry from the fence, it is decidedly an insectivorous bird, as is proved, were it nothing more, by its ungregarious habits. Most animals which feed on vegetable productions, such as the sheep, are social and gregarious, on account of their food, as we shall afterwards see more fully illustrated; but, in the case of animals, such as the fox, that feed on live food, which is usually more precarious and less abundant, it would never do to associate in numbers. The redbreast, therefore, is compelled to be unsocial to preserve his existence; for, were redbreasts to congregate like house-sparrows, they would soon eat up all the worms and insects around their haunts; whereas one bird may contrive to subsist for months there. Instinctively aware of this, as it should seem, the redbreast will allow no intruder to remain within his chosen haunts without doing fierce battle; and, though such strife for territorial dominion rarely, I believe, proves mortal, it is always sufficiently galling to the defeated bird to make him depart, and to prevent his future inroads.

It would appear from some casual observations, that the redbreast, as well as the blackcap and similar birds, feed their young on a greater proportion of small fruit, when they can procure it, than they care to select for their own eating; for the redbreast has been seen to feed his young almost exclusively on red currants; but as the redbreast is a very early breeder, it is impossible to procure any small fruit, at least for the first brood, unless privet or bitter-sweet berries be had from the hedges. I once had a caged redbreast, which would eat bitter-sweet berries, though no other fruit-eating bird would touch them.

The redstart is by no means so common a bird as the redbreast, which it greatly resembles in feeding, and in some of its habits, while the hen redstart may more readily be taken for a robin without the orange breast, than for a nightingale, as it often is. The cock redstart, however, when in full plumage, that is, during the breeding-season and after moulting, is much greyer in colour, with his white forehead, his deep blue-grey head and back, his black throat, and his shining red tail, rump, and breast. The blue eggs, again, may be mistaken for those of the dunnock.

The food of the redstart is so similar to that of the robin, that the same remarks will apply; but it is more a garden bird than the robin, building most usually in the hole of a wall, and feeding its young with such insects or caterpillars as it can find in the bushes. As it eats both elder-berries or currants itself, though by no means so fond of them as it is of worms and insects, it is very probable that it may feed its young with these as the redbreast and blackcap are known to do. It can rarely, therefore, do much damage; and, though a few currants may sometimes be purloined, yet there can be little doubt of the redstart always saving many more than it ever consumes, by devouring so great a number of the leaf-rolling caterpillars which so extensively deform and weaken the currant bushes in gardens.

There are several species of very pretty and active little birds, termed tits or tit-mice from their peculiar motions, which will most appropriately fall to be considered here. The several species differ in size, in colour, and in a few other peculiarities, but nevertheless have a great similarity in their habits and in their food, and although they are certainly insectivorous, they are also much more omnivorous than any of the preceding species. The most distinct of all is the bottle-tit, so called on account of the bottle-like appearance of its nest; but this species not being omnivorous, like the others, and living wholly on insects, I shall pass over with the remark, that nearly all which I have already said on the habits of the gold-crested wren will apply to it, except that the bottle-tit does not seem to frequent the northern parts of the island like the other.

The best known of the species is the tomtit (*Parus cœruleus*, Lin.), called in Scotland the *blue-whaup*,—a prying, impudent, fearless little fellow, capable of subsisting where almost no other bird could find food, inasmuch as nothing comes amiss to him of an animal or vegetable nature that he can peck into with his small black bill, as hard as horn, and as sharp as a broad awl. With this efficient instrument, he speedily breaks up the hard wing-cases of all sorts of beetles, and the envelopes of chrysalides and pupæ, and will (to get

at these), dig into the bark of trees like the woodpecker, and also into their buds. This, however, so far from being a destructive, is a very salutary habit, for the tom-tit does not, like the bullfinch, eat the buds themselves, but "the worm i' the bud" within, discovered by a similar instinct to that by which the snipe discovers worms beneath the surface of the soil. Were the worm left in the bud, it would to a certainty destroy it by eating out the core, and not only so, but, when it arrived at insect maturity, would become the parent of a numerous brood of other worms, each feeding on a bud, and in this way might do very considerable injury. The unwearied activity and perseverance of the tomtits, by visiting and unworming an incalculable number of wormed-buds, must therefore prove very beneficial in gardens and orchards, destroying so many latent pests that no human penetration could discover. Equally beneficial are the services of this bird in discovering and devouring the pupæ and chrysalides in crevices and chinks of the bark of trees, for nearly all such found in these situations are from caterpillars which have fed on the leaves, and of course would give origin to similar caterpillars, were they permitted to undergo their transformations.

In consequence of their eating animal food, and having harder bills than the redbreast and dunnoek, the tomtits often procure a meal from the bits of meat or sinew left on bones, though they prefer (when they can get it) any remains of the marrow, and next to that they like suet, and will not refuse lard or a bit of fat bacon. They will even try to loosen the teeth of a sheep's jaw to see what they can find in the socket; and, for the sake of dainty bits of fat, will venture with little fear up to the very door-way of a butcher's shop.

With respect to vegetable food, they are no less knowing, and prefer what is delicate as well as nutritive, being particularly fond of every sort of nuts and the larger seeds, which most resemble nuts in quality, such as the seeds of sunflower, hemp, pease, and the like. It may well be supposed that their small beak, hard though it be, is inadequate to manage such large seeds in the way they are shelled by the linnet or the bullfinch; but the tom-tit is a most dexterous and ingenious seed-breaker. In the case of a pod of Prussian blue pease, for example, he will first peck a hole through the shuck or shaup to get at a pea, and this, when he has procured it, he fixes between his claws, while he hammers away at it with his bill till he gets at the mealy kernel, which he hollows out and devours, leaving the empty shell. He does the same with a hemp-seed, and it is surprising to observe how small a hole in the shell will sometimes suffice to enable him to get at the whole contents.

Dr Bechstein says that the tom-tit eats berries; and, from its omnivorous habits, this is not improbable; but I have never myself observed the fact: and, though I have seen it pecking holes in fallen apples (never in those still on the trees), I am by no means certain whether this was not for the purpose of getting at some grub whose depredations had caused the fall of the fruit, or to obtain the seeds at the core. Be this as it may, the bird certainly commits very few or trifling depredations on any sort of garden-fruit; and, upon the whole, may be considered as producing more benefit than injury to cultivators; yet, from some prejudice against the bird, an exterminating war is carried on against it by parish rewards in some parts of England.

"We still continue here," says Mr Knapp, "that very ancient custom of giving parish rewards for the destruction of various creatures included in the denomination of vermin. In former times it may have been found necessary to keep under or reduce the numbers of many predaceous animals, which, in a thickly wooded country, with an inferior population, might have been productive of injury; and we even find parliamentary statutes enacted for this purpose; but now, however, our losses by such means have become a petty grievance; our game-keepers do their part in removing pests of this nature, and the plough and the axe leave little harbour for the few that escape; and thus we war on the smaller races of creation and call them vermin. An item passed in one of our late churchwarden's accounts was 'for seventeen dozen of tomtit's heads.' In what evil hour, or for what crime, this poor little bird could have incurred the anathema of a parish, it is difficult to conjecture. In summer it certainly will regale itself with our garden pease, and shells or pods of marrowfats with great deterity; but this, we believe, is the extent of its criminality. Yet for this venial indulgence do we proscribe it, rank it with vermin, and set a price upon its head, giving fourpence for the dozen, probably the ancient payment when the groat was a coin. However powerful the stimulus was then, we yet find it a sufficient inducement to our idle bat-fowling boys, to bring baskets of poor toms' heads to our churchwarden's door." These birds are not, however, most usually taken by bat-fowling, but by snares and other contrivances, of none of which the tomtit is the least afraid. White of Selborne says, that, when a boy, he had known twenty tomtits caught in a morning, with snap-mouse-traps, baited with suet, and I have known considerable numbers taken in Scotland with horse-hair nooses or *girms*, baited with bread or hemp-seed.

There are two other species sufficiently resembling the tomtit in size and general appearance, to be confounded with it in a boy's basket full of heads taken to the church-wardens, though readily distinguished by naturalists, and even by bird-nesting boys. These are the cole-tit (*Parus ater*) and the marsh-tit (*P. palustris*). Both of these have black heads, while the tomtit's head is blue. The cole-tit is also at once readily distinguished by its shining glossy black head and throat, from the marsh-tit, with its dull, not shining black head and chin. The cole-tit, besides feeding on the same sorts of food as the tomtit, though not so omnivorously, is very fond of pine-seeds, on which account it most abounds in fir-forests and plantations. During the autumn and winter both of these come into gardens and orchards like the tomtit, in families or small flocks, but do little or no injury. This is the only species of tit, I believe, which builds in holes on the ground, in preference to holes in trees and walls. The marsh-tit is perhaps more common in this country than the cole-tit, and a family of them may often be seen in the autumn attacking the ripe seeds of a sunflower, which, when they have discovered, they daily visit so long as a single seed remains, holding each seed firmly between their claws till it is neatly unkernelled. They may occasionally taste other seeds, but prefer those of the sunflower to every other, and this, I believe, is the full extent of their depredations.

The greater tit, oxeeye, joe-bent, or willow-biter, as it is variously termed,

has also a shining black head and breast like the cole-tit, but is readily distinguished from all the others by being nearly a third larger, while it is more gayly coloured with yellow, olive, and blue. The greater size and strength of its bill renders it more capable of digging into the crevices of the bark of trees than any of the preceding, and it is also fonder of climbing up the trunks of trees than the tomtit, in pursuit of lurking grubs and beetles. In this way it is of essential benefit in orchards and gardens, and ought not to be begrudged a walnut or a filbert in reward for its services, and even were all the roots and seeds reckoned up which these birds may occasionally eat, they would be of such small amount as to be unworthy of consideration.

Having thus given brief sketches, whose general accuracy I can safely vouch for from personal observation, I shall proceed to the next division of our subject in the next number.

J. R.

(To be continued.)

ON THE AGRICULTURE OF THE COUNTY OF ARMAGH.

By Mr HENRY L. LINDSAY, Civil Engineer and County Surveyor of Armagh.

THE county of Armagh is well situate for agricultural and commercial purposes, being bounded on the south by the seaport town of Newry, and stretching thence north-west till it meets the counties of Tyrone and Monaghan, leaving the county of Down between it and the sea towards Belfast. Its greatest length from near Newry to Charlemont, is 32 English miles, and its greatest breadth from west to east, about 20; it contains $484\frac{1}{2}$ square miles, including mountains, bogs, and lakes, which, in many parts of the county, form a very considerable feature, and of which further notice will be taken in the sequel. It contains a population of 220,651 inhabitants, according to the late census, all engaged in agricultural and manufacturing pursuits; and if it be considered that the arable land of the county is comprised within a space of 413 square miles, it will leave, at an average, 534 inhabitants for every square mile of cultivated ground.

The county is divided into eight baronies, but nature seems to have made but two grand divisions of it, not only in the manners and customs of the people, but in the altitudinal position and quality of the soil, by a line of hills which stretch from Newry

to the east of Newtownhamilton, and thence on to Keady and Middletown, dividing the county into nearly two equal parts, leaving to the west, or unimproved side, the baronies of Upper Orier and Upper Fews, and part of the baronies of Lower Fews, Armagh, and Turenny, and leaving to the east, or improved side, the remaining portion of the baronies of Lower Fews, Armagh, and Turenny, and the baronies of Lower Orier, Oneiland West, and Oneiland East.

The western division of the county is chiefly mountainous and barren. Of the mountains, the highest is Sleive Gullion, near the town of Forkhill; it is 1750 feet above the level of the sea, and the Armaghbreague mountains, situate between Newry and Keady, are 1200 feet above the sea.

The cultivated parts of this division of the county are generally composed of argillaceous earth with, in some parts, a clayey subsoil, and in other places, rock and a kind of granite and sandstone. The general aspect is poor and barren, with scattered hamlets, mostly erected in the rudest manner, upon spots of ground which have been reclaimed either from *bog* or *mountain*, or, at greater labour, cleared of stones which had previously covered the surface.

The manners of the people are rude and uncultivated, and particularly so on the borders of the county of Monaghan, where the people seem to be of a fiercer race than those in the interior of the district; and though they may appear a simple people in the eye of a stranger, yet, in their local disputes, and in the ancient Irish customs, some of which they still retain, there appear much discontent, and habitual idleness, sufficient to create a feeling of surprise in the mind of any one who is in any degree acquainted with the maxims and regulations which govern the habits, and arrange the intercourse, of a well ordered community.

The general aspect of the eastern division of the county is pleasingly sublime, and affords, in the vernal season of the year, one of the grandest spectacles to the traveller, that the eye can behold; it may truly be said to be the garden of Ireland. But this delightful view is not produced by the excellence of the mode of culture, as under that head it will be described as deficient in numerous instances. The beauty of this district is

entirely owing to the ground being diversified by a series of hill and dale, which present an undulating surface that seems to be more the work of art than of nature. The regular formation, and variety in appearance, of the convexities of those little hills which so numerous and closely intercept the distant view, present at different positions, the most diversified landscapes, the combinations of which produce a beautiful panoramic effect. The natural beauty of the surface is greatly augmented by the general effect of the husbandry. The planted fences, the neatness and cleanliness of the farmers' cottages, accompanied with clumps of wood, a well cultivated garden, or neat little orchard, give to the whole scene the aspect of a richly ornamented demesne, but somewhat more rural than those manorial inclosures.

The county might yet be greatly improved, by the opening of good communications with the sea, and with the more northern parts of Ireland. As it is, two canals pass through parts of the county; one goes from Newry to Lough Neagh, the other from Belfast through Lough Neagh to Lough Erne, which is now being completed. Lough Neagh partly bounds this county on the east; there is therefore a navigable communication with the sea at Belfast and Newry, which is of great benefit to the inhabitants of the eastern portion of the county. A new road has also been made from Monaghan to Belfast, through the city of Armagh and the towns of Middletown, Portadown, and Lurgan in the county, and which has been found to be very useful to the agricultural improvement of the district. The roads of the county, in general, are not good, being extremely hilly, and requiring much amendment. A new road is about being made by a *Turnpike Trust*, from Charlemont to Newry, through the city of Armagh and the town of Markethill, which will not only be a vast improvement and stimulus to the increase of the agriculture of this county, but will tend to promote the general interests of the contiguous districts. Agriculture and commerce may both yet be highly improved, by the opening of good local roads, which would enable the farmer, at the same labour and expense in travelling, to convey a greater quantity of goods to market, and to return, not only with greater ease and comfort, but with larger loads of coal, timber, &c.

The land in the eastern district is very good, but it varies from a rich limestone to a light clayey and gravelly soil, intermixed with considerable portions of rich meadow land. The limestone soil is confined to parts of the baronies of Armagh, Turenny, and Oneiland West, comprising about 40 square miles. The remainder is chiefly a loose brown stone earth, in many parts having a clayey and tenacious bottom, and in other parts gravel. On account of the undulation of the surface, and the thinness of the vegetable earth in many places, the clayey subsoil is preferable to it, and which, by manuring and ploughing, would be much improved, and incorporated with the vegetable earth. By this plan, several parts of the county might yet be highly improved, and a fresh stimulus given to the well disposed industry of the agriculturist, who, after many days of anxiety and labour spent in the cultivation of a small farm, would, with pleasure, behold the good effects of his endeavours, and enjoy that satisfaction in retirement known only to the active and industrious.

In giving a description of the qualities of the soil, it may be necessary to particularise each barony, and, commencing with the western division of the county, I shall, in the first place, take the barony of Upper Orier. This barony extends from the town of Newry along the northern boundary of the county of Louth to Forkhill and Slieve Gullion Mountain, and stretches on the right bank of the Newry River, to five miles below the town of Newry. From this part of the barony, the beautiful and majestic *hills* of Rostrevor may be seen to advantage, as also part of those which overhang the Bay of Carlingford.

The soil is very light, so much so, that, except in very few instances, it is insufficient to produce wheat. The surface is so overlaid with large and scattered blocks of stones, that it is by much labour a piece of ground is made available for the general purposes of tillage. The stones are of soft granite and freestone, and appear exposed on the faces of the several hills and mountains, which occupy the greater portion of this barony. Small lots of ground have been reclaimed from bog, a considerable extent of which is to be seen in this district, and from which the town of Newry is chiefly supplied

with turf. These lots of ground, as well as those which are closer to the hills, are generally occupied by small cottiers, who merely gain a precarious livelihood by attending to the cultivation of their little holdings, and endeavour to pay their rents by the cutting and setting of turf, or by the feeding of pigs.

The barony is thickly inhabited, having a population of 40,000 to an extent of seventy-one square miles of surface, and if the mountains, which measure eighteen square miles, be deducted, it will be found that the population depends for subsistence upon the remaining fifty-three miles. A necessity of letting land in small lots, in order that each individual householder may possess a little, is thus created, and the farms in consequence are very small, varying from two to twenty acres, but the general average does not exceed four acres in each lot. The fields are also very small, and separated by stone fences constructed in the rudest manner; there is, in consequence, very little shelter for cattle, except on the grounds occupied by resident landlords, and those contiguous to the town of Newry.

The farming in this district is not in an improved condition, the cottiers invariably endeavouring to take as much out of the ground as they can, with little labour. The farms are thus never improved; and the people, instead of putting in crops by rotation, which would tend to improve the land, and increase *the stock*, run the ground out by taking off a succession of crops, the crops of course frequently fail. After this occurs, the system of laying ground out to rest is adopted, and thus the proper cultivation of the country is prevented, a disadvantage not only to the individuals immediately concerned, but to the general welfare of the country.

The barony of Upper Fews, which lies to the west of Upper Orier, is very mountainous and barren. The land is much of the same quality as that of Upper Orier. The mode of culture is precisely the same, as indeed is the tillage in general of the entire western district. The farms are small, and the cottagers seem to be extremely poor. The substratum of this barony is chiefly a clay-slate, (?) so that the soil has in general a deep brownish colour. Much improvement may be effected in the lands, by a proper system of drainage, and the application

of corrosive and replenishing manures. The fences are very irregular, and almost invariably ill constructed. The people seem careless about improving their dwellings, and never look beyond their immediate wants, but are satisfied when they can enjoy the present gratification of a bare and simple sufficiency, to supply the easily satisfied claims of nature. They are described as native Irish, and I think with truth, as they seem to differ widely in their manners and habits, from the people of the more northern districts. The Irish language is not only spoken fluently among them, but forms their principal dialect.

There are some good streams in this barony, which might be turned to advantage for manufacturing purposes; and as this part of the county is not more than from seven to ten English miles from the port-town of Dundalk, it would be sufficiently near a good market and exporting town. There may yet be a great opening for industrious pursuits made in this barony, for it possesses the capabilities of becoming one of the most thriving portions of the county of Armagh.

To a practical observer of the capabilities of the soil, who looks upon it as he would upon massive gold, which might be wrought into the most various and beautiful figures, the present cultivation of this district of the county presents a subject of pity, for the unmitigated wretchedness of its inhabitants can scarcely be conceived, and is sufficient to excite the deepest sympathy. At first sight the observer cannot fail to feel the most unaffected compassion, for individuals who are such apparent sufferers. But on consideration it will be found, that the causes of all this wretchedness arise, in a great measure, from negligence and unconcern, to make more of land than had been made by their fathers, and which indifference perpetuates, of course, a foolish and mischievous adherence of a bad system of agriculture. It might reasonably be expected that their natural wants would induce the people to adopt even the first hints of a better system of farming, in order to raise their condition above the ordinary low level of present existence; but sympathy for those is almost misplaced, who will not avail themselves of the practicable means which are placed within their reach of improving their condition. One of those most efficacious means is the perusal of, and following the practical in

structions contained in several essays on the improvement of small farms in Ireland, which have of late years been presented to the public, and particularly those to the inhabitants of the county of Armagh. I need no more than allude to the valuable lucubrations of Mr Blacker and Martin Doyle.

Two of the best essays that have been written on farming in the north of Ireland, are those of Mr Blacker of Armagh, who treats the subject in a simple and practical manner; and if the people were only to adopt his plan, according to their various circumstances, they would soon find, that his recommendations are not only founded on sound theory, but on excellent practice. His plan being simple and easy, may be adopted by the meanest individual, upon the most inconsiderable plot of ground. As these essays have already met with a great degree of publicity, it is needless for me to notice the system that he particularly recommends, farther than to characterise it as the rotation, green-food, and soiling system, which not only gives possession of a numerous, healthy, and thriving stock, but commands a large quantity of manure by means of which the land may be kept in perpetual fertility. For my own part, having seen that plan in operation, I feel myself bound to say, that a more regular, systematic, and practical manner of cultivating small farms, has never been developed. As a proof that it improves the ground, whilst at the same time it increases the stock, it may be only necessary for me to mention a few instances, out of the many very manifest improvements which I have seen, where the rotation-crop system has been adopted, on a farm (within a short distance of Armagh) on the estate of the Earl of Gosford, under the agency of Mr Blacker. I have seen the improvements made by the occupier, John Hogg of the Townland of Drumgaw. He holds about ten acres of a light gravelly soil, of vegetable mould, scarcely nine inches deep, which in consequence was always easily worn out, when not cultivated in an industrious manner; and the occupier was incapable of paying L. 4 a-year for the entire lot, though his annual rent was considerably more; he was therefore in arrears to his landlord, and in debt to his neighbours, and striving to exist on a miserable pittance. The feeding for a cow occupied three acres of this impoverished land, and one might suppose that the other seven acres would have been

sufficient to support the occupier, with moderate food, and, by the sale of its additional produce, enabled him to make the amount of his rent at the neighbouring market. But no; the produce was scanty, and of a bad quality, and frequently failed for want of strength in the land; and, in consequence, the butter produced from the cow, and perhaps the refuse milk, had to be sold to make up the deficiency, and thus the man with his family made out a precarious livelihood, housed in a wretched hovel, scarcely fit for a human being to enter. He has now adopted Mr Blacker's system of managing small farms, and the change is manifest, though it is only three years since he commenced it. I have heard the man declare his sentiments concerning the new system of farming, at the last *farmers' dinner*, which is annually given by the Earl of Gosford, in the town of Market-hill, in this county.

His words were: "That he had been in distressed circumstances before Lord Gosford bought the property, (upon which Hogg resides), and was intending to go to America, but having got encouragement from Mr Blacker, he had followed his advice, and his farm was now all under the *four course rotation*: he had two cows and a horse, had a cart and a plough, owed no rent now, though he was deep in arrear formerly; had bought *more* land and was in the way of doing well. The new system kept himself and family all busy, and paid them well for their labour: he formerly had been obliged to pay L. 7 for potatoes for his family, and he now had L. 3 worth to sell, owing to the manure from his turnips."

Another instance must suffice. In my travels through the county, I examined a farm of three acres belonging to Michael Clarke, near Hamiltonstown, on which he has made great progress, in the green crop system. His statement at the farmers' dinner, where he received a premium, "for the best rape sown after a grain crop," in regard to his improved condition, was in these words:—

"When Mr Blacker first came to my house, I had fallen into arrears: distress of mind, and ill health that it brought on, had driven me to a state of despondency; I did not care what became of me, or whether I was turned out or not; I was in despair, and my family in misery surrounding me. He told me, he would help me, if I would do as he directed, and that he would send a person to instruct me, and the place would be worth having, if it got justice. I did not believe that it it ever would have turned out as he said it would, but as he was so kind, I promised I would take heart again, and do as

I was bid. Accordingly, Mr Bruce (the agriculturist) came and pointed out what was to be done. I got up my spirits, and my health got better. Mr Blacker lent me a cow when I had got clover to feed her on. The first year I was able to pay nothing, but he saw I was doing my endeavour, and he did not press me; the next year I paid a year and a-half's rent, the one after I paid another year and a half, and the one following I paid two years' rent, and I now expect to be able to clear off all, and to have my cow and pig to myself. I have a new loom besides, and all my ditches (dykes) are levelled, and the whole farm in good heart. My health is got better, and I have no more to say, gentlemen, but thank God, and his honor (Mr Blacker), I am in the way of doing well. I have meat for myself, and meat for my cow, and meat for my family, all provided for the next twelve months, and it is long since I was able to say so before."

From the foregoing statements it must be admitted, that the rotation system is working well, and I am glad to have it in my power to say, that it is now allowed by all those who are capable of forming a judgment on agriculture, to be of vital importance to the country in general, and to the farming interests in particular, and that it is spreading apace throughout the country.

I have seen several instances of the same improvement in husbandry on other lands which are under the management of Mr Blacker; but it is much to be regretted that it seems so difficult to persuade the people to change their old habits. Such is the obstinacy displayed by some, that though they may have actually beheld the improved condition of their fellow-labourers by its adoption, they still adhere with indolent pertinacity to their degrading ancient customs.

" Careless they live, and, unsubdued by thought,
Uncouth, unknown, they're heedlessly forgot,
Our fathers were, and so are we, say they,
Like them we'll live, like them we'll die away;
And thus the land unbroke, unturned bequeaths,
A living stain upon our country's wreaths."

The principles upon which Mr Blacker's system of the management of the soil suit with advantage the small farms of the north, are equally applicable to the larger farms of the south of Ireland. On a large farm of perhaps 100 acres, it would not be so easy for a farmer to attend to a regular four course succession crop, for a series of years, and bestow constant at-

tention on the cultivation of every part of his farm, and at same time visit the markets to make sale of its produce. But he might very well adopt a general plan, corresponding in principle with that of Mr Blacker's, which would enable him to direct the management of the whole, and make a considerably greater profit than he had been in the habit of making. By this means he might profit as much from fifty acres as he formerly did from 100. The farm, therefore, of 100 acres, which was badly managed, supporting only one family and its attendants, could be cultivated under a proper system, so as to support double the number of persons in the same degree of affluence. This statement need not be considered as an exaggeration, for I believe if Mr Blacker's plan were fully carried into effect, Ireland would be capable of supporting perhaps three times the present number of her inhabitants. There cannot be a shadow of doubt, but that the green crop system of cultivation is the best.

That portion of the Baronies of Armagh and Turenny, which is included in the eastern district of the country, takes a course from Keady by Middletown and the city of Armagh to Charlemont. The northern parts of these baronies are composed of limestone soil, running in a direction from Tynan on the west, including the rich and ornamented demesne of Tynan Abbey, to Charlemont on the east, and to the city of Armagh on the south. As it is not the object of this report to enter into a geological description of the substrata in general, I shall merely express, in the plainest language, its nature, in order to convey my ideas as to the qualities of the soil. It must be admitted that an accurate geological survey of the country would be vastly useful, even as regards the cultivation of the soil; but as that subject will for the future occupy the attention of abler individuals, in the persons of the geologists of the British Association, I shall cautiously abstain from making any remarks, save what may be useful to a practical farmer, in his simple and rural condition.

The land in this portion of the baronies alluded to, is in general good arable, with partial lots of meadow, and a considerable portion of useful bog. The farms are kept clean and

neat, and the farmers seem to be not only tolerably comfortable, but to possess a desire to become so, and to endeavour to give every thing about them an appearance of order and cleanliness. For this purpose the houses are whitewashed at stated intervals, I should suppose at the spring of each year, and are enclosed and sheltered with good and well-planted fences; and it almost invariably occurs that an orchard is attached to every respectable looking house. Though the farms in general are not large, scarcely ever exceeding thirty acres, the people, by the attention and diligence with which they endeavour to improve the ground, are in the enjoyment of those advantages which enable them to live comfortably on its produce. This fully accounts for the numerous population of this part of the county being better clad, more comfortably supported, and better able to make a genteel appearance in public than their more southern neighbours, who are less diligent in attending to their agricultural affairs.

The fences in this neighbourhood are in general rather rugged, and too close to each other; and the fields being too small, it would be a very great improvement in the system of agriculture were they regularly squared, and each made to contain not less than four acres. By this means the fences could be made sufficient to afford good shelter, and the ditches could be so arranged as to answer all the purposes of drains, where drains are useful or necessary. And as the growing of flax seems now to be becoming very general in this county, it would be highly useful that every farm should have a drain or collecting pool in the lowest part of it, for the purpose of steeping flax, which would correct the nuisance that at present exists, of steeping it in pools on the road side. In addition to this very great advantage, a considerable saving of land would be effected, by the making of proper fences and ditches, for I will venture to assert that one-third of the land, at present occupied by fences, might be made to answer the purpose, and far more effectually.

The ground about irregular fences can scarcely ever be kept clean, and, in consequence, the brambles and briars that grow by the sides, create such an obstruction to the improvement of what is generally called in fields the *head-land*, that little, if any

good, is ever derived from the ground within some feet of the fence. This is a serious inconvenience, the brambles not only injuring the soil, but occupying a considerable portion of ground, which might be useful were the fences properly made, and the ditches kept constantly clean.

The ancient city of Armagh is situate in the barony of its own name, and is surrounded on all sides by the first quality of limestone earth; on the south is situate the demesne of his Grace the Lord Primate, of which, though small, the ground is boldly and magnificently undulated, making it appear to much more advantage than if it had been larger and less diversified. It is richly ornamented with full-grown timber. To the north of this demesne is a pretty and enclosed improvement called *Dobbin's Folly*, highly ornamented with several plantations, and some pleasing and natural waterfalls. At the south end of the *folly* is the basin which supplies the pipe-water establishment of the city, and so great is the nuisance caused by the steeping of flax in several of the pools which are attached to the tributary streams to this basin, that, during the time of the steeping, the principal stream into which the others flow is obliged to be diverted into a different course; and, if the basin were not sufficiently supplied with water to answer the use of the citizens for at least a month, serious inconvenience would occur for want of pure water; therefore, in the improvement of agriculture, it should be as much the object of the farmer to make proper flax-pools in his land, as to cultivate the flax itself as a source of profit.

The next Barony that I shall describe is Oneiland West. It is situate to the east of the baronies of Armagh and Lower Fews, and extends to the River Bann and Lough Neagh. It is the largest, the most populous, and the richest barony of the county; and contains eighty-eight and a half square miles, with a population of 52,000. The land in general is of the best description, particularly the limestone district, which extends in a narrow line from near Charlemont, by Loughgall, to within five miles of Portadown. The remainder of the soil is on a sandstone substratum. There is a considerable portion of bog in this barony. In the vicinity of Lough Neagh and the River Bann, the land is principally arable, with partial portions

of meadow, chiefly alluvial, and, in several parts of the barony, the reclaimed and exhausted bog might be converted into rich meadow land by a proper and judicious drainage of the country; to effect which, it would, in the first place, be necessary to lower Lough Neagh to at least the summer level, and give a sufficient fall to the several lodgments of water, not only in this barony, but in those parts of the baronies of Oneiland East and Lower Orier, which are similarly affected by the rising of the Lough.

It would be difficult to calculate the vast advantages that might be derived from the execution of this project, not only to the county of Armagh, but to large tracts of land in the counties of Antrim, Tyrone, and Londonderry. It is said that the drainage of 250,000 acres would be effected by it, and it is quite practicable to drain the Lough, it being forty-five feet above the level of the sea. It may be considered that the period is not far distant, in the scientific and practical improvement of the country, when some enterprising individuals will set themselves in earnest to the work. If the value of the drained grounds were only to be increased five shillings per acre, it would realise £.60,000 a-year, which would amply repay the expenses of the first outlay in draining, and in compensating the several parties who may have an interest in preserving the water to its present level.

This drainage would greatly improve the lands of the baronies of Oneiland West, Oneiland East, and part of Lower Orier, contiguous to the River Bann, which flows into Lough Neagh. At present these baronies, for want of a sufficient fall of water, are deprived of the use of extensive mills which could be established in the neighbourhood, and from the want of which much loss is incurred in sending produce out of the county which might be manufactured within it.

The advantages that may be derived by the falling of even a small stream, may be seen in the district of Keady, in the south-west end of the barony of Armagh. This stream borders the mountainous district of the western division of the county, which, not many years since, was quite an uncultivated and unimproved district. A stream from the clear lake at the borders of the county, between Keady and Castleblaney, flows onward

by Keady towards Armagh, where it gets the name of the Callan River. On this stream several mills have been erected in the neighbourhood of Keady, and between Keady and Armagh, the advantages derived from it, by increased employment and extension of capital, have given such a stimulus to industry, that more flax has been grown in that quarter this last year than in any other equal portion of the county. The people, young and old, being constantly employed, exhibit a desire to promote good order and social intercourse among themselves; and the expending of capital among them tends to promote this feeling among every grade of the inhabitants. This social intercourse teaches them that man was not intended to live for his own benefit in this world, but that he should possess a constant and unceasing desire to promote the happiness of his fellow-men, and to extend to others the blessings which he himself enjoys.

By the lowering of Lough Neagh, the River Bann, which is now nearly level, would have a sufficient fall to work three or four large mills on each side of it, in the baronies of Oneiland West and Oneiland East. A body of water such as there is in that river, with a seven or eight feet fall, would be sufficient to drive an under or a breast shot wheel; and as the number of persons who would be employed at these mills would entirely depend on the *sort of manufacture*, I shall only say that, in addition to a great increase of employment which would thus be afforded, an increased impulse would be given to trade of every description, and the country would so advance in prosperity as to exceed the most sanguine hopes of those who at first would only be inclined to look to the advantages likely to be derived from the working of machinery itself.

In addition to all this, the increased value of the land, and its enlarged produce, and the consequent demand for labour, would give the already well-disposed industry of the inhabitants in that district a further incentive to management, carefulness, and zeal in the promotion of their own and their country's benefit.

To any person viewing the progress that is making in the improvement of machinery, and the facilities that are being afforded to the ready conveyance of goods and merchandise to and from all parts of England into the interior, it would seem that the time has really arrived for the people of Ireland to bestir

themselves, else they will be unable to compete with their English opponents in their own markets.

The time has certainly arrived when dispatch should constitute the life and spirit of business in Ireland. To an extensive capitalist in England the expense of the conveyance of merchandise by steam from that country to this forms a very small portion of expenditure, when compared with quick and extensive sales. In England he has coals at prime cost, and the first advantages derived from improved steam-machinery. To counteract this, the Irish manufacturer must impel his machinery by the force of water, that cheap and natural power which abounds in his country, and he must take every advantage that science can afford in immediately adopting every expedient which would render its application the most efficient. Time lost in this respect will not easily be recalled; and, moreover, if the English capitalist establishes means of communication by *rail-roads* in Ireland, the advantage thus afforded him will enable him to take up a position from which he would afterwards be with difficulty displaced, and from which he might transport English manufactures through the length and breadth of the country before an Irish manufacturer would be aware of the advantageous circumstances in which nature had placed him.

It is to be hoped, after all, that, as a stimulus to manufacturing industry, and as a promoter of economical labour, English capital will flow into, take advantage of her natural capabilities, and be stationary in Ireland; and that manufactories, on an extensive scale, may be permanently established, so that the labouring population may find that employment at home which they are now obliged to seek in foreign lands. The apprehension that a capitalist cannot without risk of property, and perhaps of life, carry on improvements and manufactures in Ireland, though in too many instances well founded, as it regards the south and west, should not act as a preventive in the north. It is true that partial disturbances take place even in some of the northern counties, but that system of Agrarian devastation which pervades the south, is unknown in the north, where, though denizens of the same isle, the inhabitants differ in manners, customs, general pursuits, and daily avocations, so much from those of the south, that they seem to be different races of

men inhabiting different countries. The Irish are seemingly not all equally blessed with the gifts of a beneficent providence. In the south and west are enjoyed, or rather may be enjoyed, the benefits and advantages derivable from the possession of luxurious plains, golden valleys, romantic hills, and majestic rivers, which might produce inexhaustible funds for the remuneration of labour of every description, were the people but content and inclined to become peaceful subjects of a civilized state, and members of an improved and well-ordered society; while in the north the more industrious, careful, and diligent people, in every pursuit of life, have been differently placed, and operated with the task of improving comparatively barren soils, but, in the cultivation of which, their intelligence and industrious habits have produced great ameliorations both in the state of the country and in their moral habits.

The farms in the barony of Oneiland West, as well as those in the adjacent part of Lower Orier, and in the barony of Oneiland East, are larger than in any other parts of the county; some are as high as forty, but generally averaging about twenty acres. The land being principally arable in the whole district, the want of manure manifestly prevents improvement in the soil, as well as the adoption of a good system of agriculture. If a farmer were to calculate the quantity of manure which would annually be required to keep, say twenty acres of land, in good heart, so that they would produce good crops without being impoverished, he should so adapt the management of the twenty acres, that the required quantity of manure might at least be annually collected from the land itself, and the ground be kept in a state of constant working order from its own produce. The present system is, when a field has been so wrought and worn out that it can produce nothing more, it is left alone to rest for two or three or perhaps more years to afford only a scanty pasture for a few sheep or a half-starved cow, the farmer in consequence making little or nothing out of the land until he again ploughs it up, and even then, without an extra quantity of manure, it yields no produce. And, as an equivalent for this extra manuring, he is obliged to rest another field in its turn, so that of twenty acres, five are perhaps obliged to be constantly at rest.

This I feel quite certain is under the calculation, as some farmers do little more than occupy one-half the ground; but the example is sufficient to show that the system of leaving land out to rest is not good, but particularly detrimental in a dry arable country where manure happens to be scarce. The only remedy for this, is a system of *rotation crops*, such as Mr Blacker recommends, by which every part of the ground is kept in a constant state of cultivation, and a cow afforded for every three or four acres, with pigs, &c. all house-fed, their manure being sufficient to keep the land in constant good heart.

There have been improvements made in some of the lands of the barony of Onieland West, by the introduction of *the green crop system*, particularly on the Rickhill estate. An agriculturist has been engaged, whose business is to instruct the people in commencing the new system of farming, and to prove that he has been signally successful, it may only be necessary for me to say, that, since it was introduced on that estate in 1831, the desire of improvement has so occupied the attention of the people, that in the last year (1835) 287 persons had clover, 267 turnips (not including small plots), 116 vetches, and 119 on the estate are now house-feeding cattle. Such has been the improvement on one estate, and the system is spreading among the occupiers of others; and, from all that I have been able to collect from the respectable farmers with whom I have conversed upon the subject, I am led to believe that an important change has been effected upon the minds of the people in general on the advantages to be derived from an improved system of agriculture.

The agriculture of the barony of Onieland East, and the adjacent part of Lower Orier, is much the same as that of Onieland West, but the land is not so good. Part of the land of Lower Orier is of a sandstone nature, and partly of a brownish slate, while the entire of Onieland East is of what is commonly called greyish whinstone. This barony contains a very considerable portion of bog, 3200 acres; and 520 acres of lakes which might be drained, were the waters of Lough Neagh reduced in level.

The barony of Lower Fews lies between those baronies and the western district of the county, and is partly included in

that district. The eastern portion of this barony is of brownstone soil, chiefly from a brownish slate. The soil is very thin and poor, and in many parts almost worn out, from the evil effects of a bad system of farming. The fields are carelessly laid out, and are, like the farms, as small or smaller than those in the other baronies. The barony has a large portion of turf-bog. It contains one town, Markethill, near to which is *Gosford Castle*, the seat of the Lord Lieutenant of the county.

In several parts of this barony Mr Blacker's system of agriculture has been adopted, and with success; and it is to be hoped that the time is not far distant when it shall have become a general system throughout the country, for no better mode exists of giving employment to the labouring classes. The population of a country, if constantly employed, enriches it in proportion to its number. The poor man's wants are easily satisfied, he only looks to the comforts of a domestic hearth and homely fare, which, if he possess, he retires from labour with contentment. When there is constant employment, the wages of the artizan and labourer is generally sufficient to support them well in an humble and contented condition. That the people of Ireland would be contented if they were only employed, cannot, in my opinion, for a moment be disputed, and they would at same time be saved from the contaminating influence and misrepresentations of designing and ill-disposed men, who wander about for the express purpose of spreading sedition, and of disorganizing the social state of the country. That employment might be found for the people, so as to neutralize the evil designs of demagogues, might, I think, be proved without difficulty.

Though this county is very populous, yet, in the eastern portion of it, few people are found constantly idle; while, in the western portion, idleness may be observed to a very great extent, but it may be chiefly attributed to a want of proper sources of employment and incentives to industry. To employ the people profitably in this district, would, in my opinion, require no great stretch of intellectual exertion or mechanical skill. A simple plan of improvement might be adopted, which would afford general employment, and create a desire among the people of becoming industrious and careful.

In this part of the county are large tracts of reclaimable mountain, only requiring proper drainage, and a sufficient quantity of lime, to make it arable land ; but as the reclaiming of a tract of mountain would require a large capital, until a return shall have been produced, no single individual could attempt it. In the barony of Upper Fews alone are 10,000 acres of bog and mountain, which, if reclaimed, would give employment to many hands, and afford additional room for the population to expand to 8000 more than the present inhabitants in the barony, and who could live as well as the present occupiers of the arable land live, even on the supposition that no other mode of employment were to be provided (after the reclaiming of the land should have been accomplished), than that of its future cultivation. The capital expended in reclaiming this mountain being distributed in the neighbourhood, would enrich the local inhabitants, at least it would afford them a small capital wherewith to cultivate the land ; and should constant employment not be obtained by cultivation alone, a portion could be employed in manufacture, which would not only increase the means of all, but would afford a home consumption for much of its produce, and save the farmer the expense of attending distant markets, or perhaps of visiting those of the sister kingdom.

Although it would undoubtedly require a large capital to reclaim the waste lands of the county, if undertaken by any individual, who would have to pay for the entire labour, and the other expenses attending it, yet the grounds might be advantageously let to cottiers, in such lots, that, with a little assistance, they would be able gradually to overcome every difficulty. I have no doubt but that the result would be very profitable to both proprietor and tenant. A landlord might thus, at a small sacrifice for the first few years, ultimately succeed in deriving the same pecuniary advantages from the neglected lands, as he had been in the habit of receiving for the good ; and though such a change could not be instantaneous, it would work its way, and have its effects on the minds of the people, which, when operated upon by those gradual changes, would be more impressed with the advantages derived from industry and skill than by any sudden change in the system, to which they had been so long indolently attached.

: In addition to the improvement of the soil, the reclaiming of the mountains and bogs would alter and amend the climate. The injurious effects at present felt by a late harvest, would, in some measure, be alleviated. The harvest is always late in this district, and indeed throughout the county. If the months of September and October are not fine, the corn is generally very much injured, which was the case this last year, the winter rain and cold setting in while the principal crops were yet upon the ground, some standing, and more being in the stook, and very little fully saved in the higher parts of the county, in consequence of which the poor farmer's principal hopes were blasted.

There seems to me to be no effectual remedy against this constant dependence on a precarious crop of corn, but by making flax a principal crop. One-sixth or one-seventh of the land might be well occupied by flax, and it need not be sown a second time in the same ground within six or seven years. The land of the barony of Upper Fews, and that portion of the county, is quite adapted for it, flax growing well upon a light gravelly soil, and better upon a clayey subsoil. By sowing thick, it will grow finer upon such a soil than upon richer ground; true, it impoverishes the soil, but the green crop system of cultivation would always regenerate the land before the expiry of five or six years. By this arrangement the farmer would lessen the amount of the crops which require the entire harvest to ripen, by having the flax saved early in August, and it would be his principal crop for sale, as one acre of it in a farm of six acres would more than pay the whole rent of the farm, and he could, by green feeding, profit considerably on the remaining five acres.

The inclemency of the weather would thus be partially rendered innocuous; at all events, the precarious situation of a poor farmer in his dependence on a corn-crop in a wet and cold harvest, would be avoided. Employment would thus be provided for an increased population, in the manufacturing of the flax, from the state in which it is taken off the ground to that when it is woven into the finest cambrics, befitting the fairest beauties of the land, who would thus be led to manifest a desire to enhance the prosperity and happiness of the people, not only by their influence in encouraging, but by their example in

giving a decided preference to the manufactures of their own native land.

That the flax of Ireland is as fine as that of any other country, cannot seriously be doubted, though the fact in many instances seems to be reluctantly admitted. It is in the dressing of it that the Irish farmer fails in being able to compete with the foreign in the English market ; but when the growing of flax shall have become general, a new and improved system of handling must be adopted. One of the principal defects consists in not keeping the roots and tops evenly together, in the same relative position as when they were growing, without which it is impossible to break and scutch flax well ; but the neglect of which deteriorates it much in value, perhaps not less than one shilling a stone below what it would fetch if properly handled in the first instance. Were this evil to be remedied, I have no doubt but that the Irish flax would be equally valuable as that of any other country.

This subject brings me to the consideration of one of the immediate effects which would result from a general system of growing flax ; flax and scutch mills would be erected, and in a short time spinning and various other machineries would follow, and mills, which in the present state of the country only are partially scattered over the county, would then be seen upon the fall of every stream, many of which flow almost uselessly through uncultivated districts. It is manifest that neglect of the advantages which might be derived from the power of water, must be detrimental to the interests of the occupiers of the country through which it flows, and of course it must be also to the nation at large, so that neglect in this particular is not only an individual but a national loss. Thus it happens, that Ireland, with all her natural advantages, has permitted the other portions of the empire to outstrip her in every thing which requires art and industry to support and carry forward. In the feeding of cattle it may be said that she stands pre-eminent, but that arises solely from the natural fertility of her plains, and not from the hand of industry. The draining of Lough Neagh would greatly enhance the value of water power in this county, and on the whole, if the streams and small rivers were put into active operation, the employment of the poor would be secured, capital would

flow into the county, and, as the principal portion of the labour would be effected at home, the only channel through which the money would again pass away, would be by absenteeism, which would in a great measure be prevented, if peace and good order reigned at home.

There is one power-loom mill in the county, for the weaving of various kinds of cloths, carried on by William Atkinson, Esq. of Glen Anne, within nine miles of the city of Armagh, and seven of Newry. There is machinery both for linen and cotton spinning. Mr Atkinson constantly employs 169 males and 127 females during the year. The people seem to be industrious and careful, and the general appearance of the neighbourhood comfortable.

The manners of the people in the eastern district are stiff and of a determined cast. They seem to possess an independence of character which leads some of them to the extreme notion of advocating a perfect equality among men in a well regulated society, but I might go farther and say of them that they think little of all men but themselves; whereas in the other district of the county, the people are of an entirely submissive disposition, and shew more of the general marks of Irishmen than those in the eastern district, except that their sincerity is not so much to be depended upon. Their manners are apparently simple, yet, under this simplicity, some lurking scheme for personal aggrandisement is frequently enveloped,—“*Latet anguis in herba.*” Trade and manufactures would teach them to act more disinterestedly in commercial intercourse, and would ultimately promote among them a sociable and confidential understanding, which would regulate their private transactions, and greatly improve both their character and conduct.

The stock of the farmers of this county is in general not good; in the western division there is little stock at all; the horses are of a poor race, and the cows small; in fact, they are what is generally known by the name of “mountain cattle.” In the eastern district, they are somewhat better, but not what might be expected in such a country. There is great want of sheep, and as they would be extremely useful in eating down the rag-weed (*Jacobæa*), I am the more surprised that such a want exists. Many fields in all parts of the county may be seen nearly covered with this weed.

ON THE DISEASE IN OATS CALLED "SEGGING."

By MR RODERICK GRAY, Peterhead.

THERE is a disease got in amongst the oat crops in this neighbourhood, chiefly on strong clay soils, called "segging." I understand it prevails in Berwickshire. The oats braird well, and continue for some time apparently to thrive; but afterwards get into a bushy state, and the leaves become very broad, like those of "seggs," or flags. Upon examining the roots, they are found diseased, and full of large tubercles, which, upon being opened, contain a reddish powder and animalculæ. The plants not capable of bearing seed continue some time in a bushy state, and then die away. Fields capable of yielding seven or eight returns, will not give three when attacked by the disease; and the grain yielded is of very inferior quality. Potato-oats are more liable to this disease than other sorts; and very ripe seed has been observed to be attacked, when that of inferior quality and cut green has escaped. Were any discovery made of the cause and cure of this disease, it would confer a great obligation to the farming interest.

Note.—In our own experience of this disease in oats, we have always observed its recurrence on the same portion of the field, and believing it, from this circumstance, to be a local affection, we have, by local draining, succeeded in effecting a complete cure. The presence of the insects we conceive to be an effect, and not a cause, of the disease.—EDITOR.

HORTICULTURE*—COMMON CABBAGE, EARLY YORK CABBAGE, LONDON NEW YORK CABBAGE, SAVOY, BROCCOLI, AND EARLY WHITE WARWICK PEA.

By MR TOWERS, Author of the Domestic Gardener's Manual, &c.
C. M. H. S.

THE *Brassica*, or cabbage tribe, presents us with the most important crops of the season, I mean the period included be-

* Two errors have crept into my last paper on Horticulture, for which, if the blame refer to me, I ought to apologise; 1st, p. 541, the fourth word of the third line from the top is printed fomenting: it need scarcely be remarked that fermenting was intended.

In the same page, lines 18-19, the word printed *rau-barbâc*, should have been

tween the first of June and the two succeeding months. It is proposed to select three of the numerous species, namely, 1st, Common round-headed or hearting *Cabbage*,—2d, The *Savoy*,—3d, *Broccoli*.

I. THE COMMON CULINARY CABBAGE, *Brassica oleracea*, Sect. 4. of De-candolle, No. 4. *elliptica*, the early York, and particularly that fine improved variety, now called London *new York Cabbage*. All the members of the tribe belong to one family or genus, termed *Brassica*: they are found in the natural order *Crucifera*, the leading characters of which are four opposite petals, ranged in the order of a cross; there are four petals or calyx-leaves, six stamens, two of which are rather shorter than the other four, and this latter circumstance gave rise to the name selected by Linnæus to designate the members of his 15th class *Tetradynamia*, a compound Greek word, which indicates the power or *supremacy of four* out of the six fertilizing organs. It may be of some importance to the farmer and cottager to be informed that, among all the plants of this class or natural order, not one perhaps is possessed of any really deleterious property. Among nearly one thousand species, as Dr Lindley observes, "scattered over the face of the world, all are harmless, and many highly useful."

The varieties of the cabbage are numerous, but he *who possesses* the best early York, has that which combines most of the valuable qualities of that excellent vegetable,—compactness of heart, firmness, sweet flavour, and convenient size and form; it is also hardy, of very ready culture, and occupies but little space. I do not recommend it merely as a *culinary* vegetable; it might, and I think should, be made to rotate with the crops of the farm. It is not my desire now to digress, but I hope on a future occasion to adduce facts which will go far to prove that every farm throughout the kingdom would be improved, and the agriculturist proportionably benefited, by a greatly enlarged rotation. The land has powers and capabilities to double its productive return: We southerners are much indebted to our northern brethren for the lessons of wisdom which their refined system of agriculture has already taught us, but these cultivators, skilful and persevering as they have effectually proved themselves to be, may still advance; and with this conviction before me, I hope I may not be deemed presuming, if, at the earliest opportunity, I venture to attempt to fulfil the intention which I have alluded to above, and for which I am collecting the requisite documents.

The *soil* for cabbage should be a sound mellow loam, of a quality usually termed *fat*, or unctuous, wherein the *silex*, which forms its chief constituent, is in a state of extremely minute division, and united to a greater proportion of argillaceous earth (*alumine*), than most common, gritty soils are; but the

Rhapontic,* its native clime perhaps being Pontus in Asia,—*Rha* is stated to be a term for the Wolga or Volga, a Russian river. "Ammianus Marcellinus, lib. xii. says, the *Rha* is a river, on the borders of which grows a root which bears its name, and is much renowned in medicine."—*Encyc. of Plants*, p. 336.

* It completely beat us to decypher the word *Rhapontic* in the manuscript. *Rhubarb* was the nearest guess we could hit upon.—*Editor*.

chief desideratum of an unctuous loam is the impalpable state of the silt; for I have analyzed one of the finest loams I ever saw, without being able to detect in it more than five or six per cent. of clayey substances, and scarcely a grain of chalk. But the cabbage will do well in most soils, provided it be exposed to the full influence of light and air, and be not shaded or stifled by trees, shrubs, or buildings.

Seed.—This will retain its vegetative power for three or more years, but it is always better to employ that produced in the preceding season, or if two or three year-old seed be used, it should be tried in heat, sown in a flower-pot: a serious loss of time may be occasioned by a failure of the seed-bed. An ounce of seed will suffice to sow forty square feet, if scattered broadcast, but less will be required, if it be sown in drills, six or seven inches asunder; and this method is always advantageous, because the Dutch or thrust-hoe can, at any time, be passed easily between the rows. If cabbage be cultivated in the field, it is calculated that half a pound of seed will afford more plants than will grow on an acre; and it is stated, in recommendation of the vegetable for the purposes of the farm, that if the cabbages be cut, freed from bad leaves, and carried to the cow-yard, "they are more beneficial than hay, given in any proportion, when only combined with straw."

"In the *fattening* of neat cattle, an acre of good cabbages may be nearly sufficient for three beasts of from forty to fifty stones each, which have been grazed in the pasture during the summer. A middle-sized bullock, in general, consumes about 100 lb. in twelve hours."* "Half an acre will be nearly sufficient for 100 sheep, when the crop is good: a sheep consumes nearly 10 or 12 lb. in twelve hours."—(*Baxter's Agric.*) I have repeatedly tried cabbage in cow-feeding, and on every account recommend the substitution of *Fork cabbages* for the coarser and more bulky varieties.

In *garden-culture*, we have to consider the object of the cultivator; if spring or early summer cabbage only be required, one sowing of a single long row or a small bed will suffice. In the southern or middle counties of England, it is usual to limit the period of sowing between the 6th and the 12th days of August; but in the north, I presume that the third or fourth week of July should be chosen. Experience has proved that seed sown early in July, will produce plants which are liable to run to seed in the following spring; while, on the contrary, the plants of late sowings rarely acquire strength sufficient to resist the rigours of the winter. *The soil for a seed-bed* ought to be lighter than that used during the future growth of the plants; it should be moved to the depth of a few inches, and made very fine: then, the line being strained tight, the first drill is to be cut by drawing the angle of a hoe in the direction of the line, with its edge resting against it. An inch or less in depth is sufficient; but, as all seeds rise better if they rest upon a true surface, and be closely embraced by the mould, it will be proper to level and compress the bottom

* There must surely be some error in this statement, of an acre of cabbage being able to fatten nearly three beasts of from 40 to 50 stones each: 100 lb. of cabbage in twelve hours, that is the average number of hours of day-light in each day, for twenty weeks from the end of October, will amount only to 6 tons 5 cwt. Now a middle-sized ox will, in that time, consume 30 tons of Swedish turnips. Do 6 tons 5 cwt. of cabbage yield as much nutriment as 30 tons of Swedish turnip?—EDITHA.

of the little drill by patting it with the back of a wooden, round-headed rake, or by placing a long pole, like the handle of a rake, into it, so as to form a sort of groove. In this, the seeds are to be scattered as regularly as possible, after which it would be as well to dust them over regularly with a powder composed of two parts (say pounds) of powdered quick-lime, one part of coal-soot, and one sixteenth part (one ounce) of flour of sulphur. This mixture is inimical to insects, and does not injure the young plants. The groove is next to be filled up with fine earth, which is to be made firm and even, by pressing it down with the flat of the spade. In like manner, all the other drills may be made and finished. If the weather be showery, and the ground in a moist state, but still free and open to work, nothing more need be done. It sometimes happens, however,—as was the case to a very injurious extent throughout the summer of 1835,—that the soil is found dry even to dustiness. In that case, as it will not answer to let the critical period pass over, the intended bed should be watered copiously for three successive nights, till it become completely moist, and a mat or two must be thrown over it during the intervening days. Seeds sown in soil thus prepared, will vegetate very rapidly; for warmth and moisture are the prime actualizing agents of vegetative life, as direct solar light is that of maturation. Waterings, or rather the ordinary sprinklings, so termed, will prove of no avail, if the seeds have been sown in arid soil, as was fatally proved last year. In hot sunshine, the mat ought to be used till the seeds vegetate. The seedling plants will be liable to the attacks of slugs and other enemies; to guard against which, they may be sprinkled with a little of the powder mentioned above; or the spaces of soil between the rows may be covered with dry saw-dust or chaff; but thick sowing is perhaps the most effectual means to secure a sufficient supply, and it is always prudent to practise it, because many seeds are inert; and it is better to displace the supernumeraries by timely thinning, than to have a paucity of plants, nine-tenths of which may perish by accidents. When the first true leaves appear, and acquire a little strength, much of the danger will be past, and the plants ought to be thinned out, so as to stand an inch asunder. Again, as they advance in growth, they ought to be reduced in number till double that space intervene between plant and plant.

Transplanting.—Some gardeners have attempted to obviate this operation; but the roots first produced are few in number, though strong, and of considerable length: the plants also acquire a tall and shanky growth; and above all, it is evident that, if cabbage plants be made to perfect their growth on the site where the seeds were sown, the allotted space must be very great, because they must be thinned out so as finally to stand one foot asunder at the least. Transplanting, therefore, should be practised, and that, too, as soon as the young plants have become three or four inches high, and begin to crowd each other. The operation effects two or three good objects. It causes the roots to produce a number of short fibres, or, as it is termed, to become “stocky:” it dwarfs the plants, and, while making them strong and c secures them to the soil; and it enables the grower to protect those like seed-bed (as some always should be) by coverings of mats thrown over arches, formed of hoops or pliable rods, in the event of very severe v

In transplanting, let the bed or plot be a good firm loam, if possi

well manured, thoroughly digged, and in a free, open situation. Select strong plants of nearly equal growth, and insert them in rows by means of a dibble or trowel, fixing each firmly in the soil, eighteen inches apart *every way*, if the variety be a free grower; but the small Yorks will do very well if the rows be that distance apart, the plants standing only twelve inches asunder in the lines or ranks. It is indispensable that the soil be brought closely to the roots, and made to press them firmly in every part; and should the weather be dry, much time will be gained by making the holes so deep as to receive the plant to the full length of the stem of each, and filling every hole brimful of soft water: then, by pressing the soil laterally and on every side with the tool, the roots will become puddled in, and secured at once. The period for the work must depend upon the growth in the seed-bed; and if the season be early, and the weather *warm* and showery, the transplanted cabbages may grow so rapidly as to require the check of a second removal, or at least to be raised up and reset; but in general, and under ordinary circumstances, it will be sufficient to leave them undisturbed, as then the crop will be ready for culture at a more early period of the spring. In the south, it is no uncommon circumstance to cut fine-hearted cabbages in April, and very good ones in May. In the north, the growth must be more tardy in most situations.

The *seed-bed* will require care and attention. I have said that some plants ought to be left in it; and I urge the practice, because, in severe winters, the entire crop is sometimes cut off. The seedlings remaining ought, however, to be raised up; the longest roots cut back nearly one-third, and the plants be re-set in regular order and distances. Thus, supposing that 200 plants remain in it, and be made to stand four inches apart in rows which are six inches asunder, a bed little more than twelve feet long and about three feet wide, including its edges, will contain this valuable stock, which in severe weather could be covered by three or four garden mats, and thus secure a pretty ample supply of plants for the spring. Another precaution may always be resorted to. In transplanting, deep drills or grooves can be formed by the hoe or spade, and along these the plants may be set so deep, that the lowest leaves may stand just above the soil. I adopted a still more efficient plan of security last October, though I do not recommend it, because I think the growth in the early spring months is thereby retarded. Having a piece of ground set up in ridges, nine inches high, and the time pressing, I planted my young cabbages in the bottom of the trenches between the ridges. On three occasions the thermometer fell twenty-two degrees below the freezing point, and not a plant has been touched, though no covering was applied at any period of the winter. My broccoli, also, has stood in perfect security, in consequence of the stems being lower than the level of the edges of trenches made expressly for them. However, as cabbages ought to be hoed freely in the autumn, and the spaces between the rows digged once or twice, as soon as the plants resume growth in the early spring, it is evident that the ridges present an obstacle to these important operations. If the winter prove mild, the cabbages will progress in some degree; but if by cold they be rendered torpid, they will start into growth with the early return of solar influence: a few may fly up to seed, but the greater part will form hearts, and can be

cut in succession. In cutting, it will be prudent never to take off the green and healthy leaves : those that are inert and yellow, will scale off of themselves, or with the slightest effort ; but the green and firm ones have still an important office to perform, in perfecting the axillary buds which produce young sprouts. These secondary cabbages, or "greens," affect an open growth, and in themselves furnish a delicious vegetable, but they may—that is a portion of the best formed among them—be devoted to another purpose of considerable utility in garden economy. The shoots when about five or six inches long, are to be gently twisted off from the stem, and the lacerated heel of each being trimmed perfectly even and smooth with a very sharp knife, but not shortened ; the young plant thus rendered a cutting is to be very carefully planted in lightish, sandy, fresh moved loam, so deeply as nearly, but not quite, to include the entire stem. The setting-stick or dibble is to be thrust diagonally into the ground in three or four places, in the direction of the heel, so as to fix it firmly in the soil, and then a little water should be given to each plant to wash the earth closely about the stem. Detached shoots so treated, will frequently produce roots speedily, and bring a supply of excellent secondary cabbages, true to the original varieties : seeds are apt to sport, owing to cross impregnations.

To sum up the chief points of cabbage-culture for spring and summer main crops, it must be observed that the *period of sowing* should be strictly attended to : the *seed-beds* are to be slightly hoed to keep the ranks clear of weeds ; the stronger plants are to be timely removed to the final beds, wherein two autumnal hoeings and a moderate earthing up must be given during the progress of growth. On the approach of spring, the intermediate spaces are to be dugged or forked, after the removal of the inert leaves, and the operation should be repeated when the plants evince the tendency to fold up their inner leaves for hearting. By a careful attention to these needful processes, a bed of fine cabbages will, in favourable seasons, be secured. Having thus dwelt so minutely upon the routine culture of the cabbage for the main spring and summer supply, I shall only allude to that part of the treatment of succession crops, which refers to the summer and autumnal months.

It is usual to give directions for sowing the seed at several distant periods ; but my object is to obviate trouble, and to simplify operations as much as possible ; and as I have proved that, by attentive management, a regular supply of fine plants may be obtained from one extra sowing, I shall presume that an extensive seed-bed or plot exists, having been prepared late in March or early in April. The mode of culture will be understood by the directions already given : what, therefore, remains to be said, will apply to the order of routine which ought to be observed subsequent to the *first of June*. At that time, we may suppose that the greater part of the cabbages have been cut, the stems remaining being left for the production of sprouts. The seedlings of the April bed that are in a state to be transplanted, should be carefully selected, and set in a bed of rich soil, watered, and attended to in every respect as were those of the spring crop. This first bed, with the cuttings of the sprouts and the other shoots yielded by the old stems, will produce an ample supply of a second crop during July and August.

After the removal of the seedling plants, those which remain in the seed-bed should be gently lifted and replaced, but at regular distances, three or four inches apart; the ground should be moved, cleared of weeds, made level, and well watered if the soil be in a dry state. Should the plants be very numerous, a hundred or two of the best might, with great advantage, be moved to a succession bed to stand in rows, six inches apart, plant from plant. Thus they will acquire stocky roots, and be checked for a time; while the seedlings will gain strength from the additional space afforded them. If a bed be formed and planted for cabbaging in June, and thence every two months; and especially if—as I must presume—a previous transplantation had already been made during May, it is obvious that a succession of crops will be secured during every favourable season till the end of October; and I may add, from positive experience, that if the weather be then fine, and the succeeding winter prove open and mild (“a green yule”), any remaining stock in the seed-bed, however long-shanked and ungainly they may be, if set deep in the soil of a well prepared bed, may make good progress to the end of November, survive the winter, and produce excellently hearted and sweet-tasted cabbages in April. Small they will be, and some perhaps will fly to seed; but those which do succeed, will amply reward the attentive care of the grower. My experience applies, of course, to the latitude of London, though in a county far westward, and much later in its productions; but I presume that in the north also these hints may be rendered to a certain extent available.

2. *The Savoy, Brassica oleracea bullata* of De Candolle,—a variety distinguished from all other hearting cabbages by the puckerings of its leaves. It is one of the prime winter vegetables, and well merits the attention of every one who has a garden or kail-yard. There are three subvarieties—the large yellow, the green, and the smaller green, which is the hardiest of the three.

The savoy must be sown pretty early in the spring, and therefore I say nothing now of the early processes of its culture; but as it will require transplanting to plots where it is finally to remain, it will be needful to observe, that, as in all respects the intermediate culture will, as nearly as possible, resemble that of spring sown cabbage, the directions above given will apply to it. In England it is customary to transplant at two or three periods of July for the main winter supply; but it will be proper to commence the work earlier in the north, and to finish by the middle of that month. The ground should be well digged and pulverized; the texture rather light, and the quality rich. Draw drills or shallow trenches about thirty inches apart; tread along the drills or press them with a broad pole, till the soil become smooth and compact; then plant the savoys eighteen inches asunder, filling the holes with water, and fixing the roots firmly in the soil. After they have become established, and begin to grow, the spaces will require the hoeings and diggings which are so essential to the progress of plants of all the cabbage family, and have been before alluded to. As winter approaches, the earth ought to be brought up to and about the stems.

The planting in open, manured trenches, in dry weather will not only secure the growth of the plants, but greatly tend to protect them from frosts during winter. *Savoys* are not considered to be in perfection, till they have

been exposed to a degree of frost; and they will subsequently furnish the table throughout the winter months.

3. *Broccoli*.—This variety of the cabbage tribe is divided into a number of subvarieties, all of which are excellent furniture for the garden. By Professor DeCandolle it is placed in the sixth division of his arrangement, *Botrytis* (*Brassica botrytis*) i. e. resembling a bunch or cluster of grapes, but this grape-like species or variety admits of another sub-variety, as No. 1. is the cauliflower, *Cauliflora*, or flowering cabbage; but No. 2. is the broccoli, and is designated as *Asparagoides*, or asparagus-like cabbage. Though the similitude of broccoli to asparagus may appear somewhat fanciful; yet as precision of classification is obtained, it will be perceived that it is far better to enter into minutiae closely, than to persist in a mode of arrangement which is equally ill defined and indiscriminating.

This delicious vegetable is perhaps without its rival in the garden, and its culture is very simple: it is too late, however, in the season to raise it from seed, and therefore, I defer to enter upon a regular detail till the spring of next year. I have, however, raised some of the finest *Portsmouth* cream-coloured, from seeds sown after the 10th of June, which produced compact and exceedingly large heads in the following April and May: it may therefore be worth while to try a small sowing as early as possible in June, following the directions, in as far as concerns the mode of preparing the soil, &c. which are given under the article cabbage, and transplanting into manured trenches, six inches deep, and ten or twelve inches wide, not later, if possible, than the third week of August. In the event of frosts, before November, no time should be lost to bring the earth that was thrown out, and lay as a ridge on each side of those trenches, to the stems of the plants, as is done in earthing celery.

But if we may trust some modern writers of new discoveries, *broccoli* may be propagated by slips, with the most successful results: Every one ought to try the method who has in his garden the stems of plants, the heads of which having been cut show a tendency to protrude sprouts. In the middle of June, says a writer, whose article is now before me, (or for Scotland, say as early as possible in June,) "I slipped off a quantity of the side shoots, and planted them. I had them well watered and well secured in the soil. They struck root in a very short time, and made strong plants which produced heads of a fine size at the usual season." "I am persuaded the plan is well deserving attention, not only with broccoli of the same kind I have cultivated (*late flowering purple*) but with many other kinds; thus an excellent variety might be perpetuated without the risk consequent upon seed."

I have not myself had an opportunity of experimenting upon this vegetable, since I saw the article quoted from, but have reason to believe that the plan has been proved to be feasible; in fact, there is nothing in the analogy of the species with its type, which is unfavourable to the operation.

4. *Pea*.—At this season of the year it may appear almost too late to speak of the cultivation of the pea; but I am inclined to notice it for a reason which will be shortly explained.

The *garden-pea*, of which there are many varieties, is found in the fourth tribe, *Vicia* (that is among the vetches) of the great suborder PAPILIONACEÆ of the natural order *Leguminosæ*, and in the 17th Class, 4th Order of the Linnean System, *DIAPYCNIA Decandria*. Every one is aware of the peculiar shape assumed by the blossoms of plants of the pea tribe; which, it is evident, can readily be made to constitute the type of a very natural class, in which most of our esteemed leguminous or pulse-bearing vegetables are to be found.

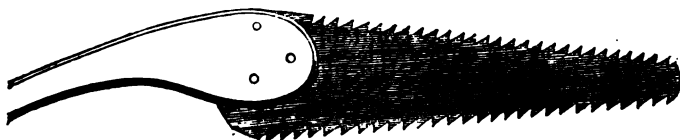
At some future day, I intend to enter at large upon the characters of all the favourite pease for table use; but on the present occasion I only allude to one, which is a great acquisition, and of very recent introduction, the early white *Warwick*. It is adapted to field, as well as garden culture, is moderately prolific, hardy, extremely early, rapid in its course of growth, soon off the ground; and of a high peculiar flavour, that to some persons is extremely agreeable, though others do not affect it.

The seed, two years since, was dear, its price is now reduced; and it is stated that three crops may be produced on the same land, and leave it open for wheat. This, however, I have not seen proved: but having grown the pea, I can recommend it to every one who wishes to possess a rapid grower. A crop sown in a long drill very early in June, may be succeeded by another sown in July, with every prospect of success. If the ground be dry, from a continuance of hot weather, the best method to ensure a vigorous plant is to dig a moderately broad trench, to saturate the soil at the bottom with water, to return the earth into the trench, and make that very wet; then, after covering the earth with mats, or green boughs for a day, just to permit the earth to settle, and so far to drain itself as to become in a workable condition, to strike a drill three inches deep, to sow the seed along it pretty thickly, but not in the crowded state too frequently seen; water should then be poured from the spout of a pot over the pease, and the loose earth returned upon the seeds, and pressed or trodden firmly over them. One liberal preparatory watering thus given, is of more avail than fifty subsequent sprinklings. *Mildew* so common on the plant of autumnal crops, is, as Mr Knight truly observes, obviated. He has had perfectly fine pease on his table in October, and it is certain that where disease can be prevented, pease in that season are a delicacy of the first-rate excellence. The *Warwick*, I think, promises to prove a valuable species for the purpose of a late crop, because the course of its entire culture is more rapid than that of the "frame" or early *Charlton* pea. When the plants rise above the soil one inch, the earth near the roots ought to be loosened by the thrust hoe. Another hoeing must be given when the plants are three inches high; and then, after drawing the lightened earth to the stems, to the height of an inch and a half, as a ridge on each side, branching sticks a yard high are to be applied. Nothing favours pea culture more than judicious sticking: the plants are brought to the light, are supported, and at the same time protected. *Mildew* is the bane of autumnal crops: it seems to be promoted by a drouthy state of soil, high solar heat during the day, and cold dews at night: rapidity of growth produced by a deep moist bed, procured by preparatory and profuse waterings, appears to be the only effectual security from this fungus.

ON AN IMPROVEMENT IN THE INDIAN SAW.

By Mr ARTHUR JOHNSON, Rampisham, Dorset.

As the smallest addition to our means of improving and preserving plantations is not to be despised, I beg leave to mention, that I have found great convenience in having a set of teeth placed upon the *back* of the Indian saw,* in pruning trees; as in the figure below: the object being to give a cut to the *under* side of the branch to be taken off, previously to sawing it above. In this manner the branch comes off *much cleaner*, and *larger branches* may also be taken off than when the cut is made only from above. Mr Holtzapps of Charing Cross, London, made this alteration for me, and I have found great advantage from its adoption.

RETROSPECT OF THE BRITISH AND FOREIGN CORN TRADE,
DURING THE HALF-YEAR PRECEDING MAY 1836.

By Mr WILLIAM GRAY FEARNside, Mark Lane, London.

PREVIOUS to entering on the retrospect of the Corn Trade, it may be noticed, that some interest has been excited in the seed trade, under the impression, that the higher duties levied on the import of foreign seeds would be partially remitted; on making, however, official inquiry, we are given to understand, that in this session there are no grounds for maintaining the supposition. The remission of the duty on seed would be of benefit to the farmer, and particularly to the grazier. In Scotland, where a considerable quantity of grass seed is consumed, the burden is felt in a more oppressive degree, as the system of suc-

* A description of this saw will be found in the 5th volume, p. 46, of the Transactions of the Highland and Agricultural Society.—EDITOR.

cessive crops requires the frequent renewal of the seed ; besides, the increase of live-stock consequent on the rapid augmentation of the population has rendered artificial feeds an object of material interest to the grazing farmer. The average annual quantity of foreign clover-seed for the last seven years imported into the principal ports of England, has not exceeded 62,000 cwts., yielding as many pounds sterling to the revenue, which is an amount not sufficiently large materially to affect it, whereas it operates heavily on those parts of the country, where, in ordinary seasons, such seeds cannot be well matured ; it not only enhances the price of the home-grown, but also of the foreign article, and induces the farmer often to use seed of inferior British quality, as, from it not having arrived at a perfect state of maturity, he can obtain it at rather a lower price than the good seed received from Germany, Holland, Belgium, France, and America. The money also is taken out of the pocket of the farmer, who is the only consumer, with the risk of the seed making a profitable return, which, as he is more northerly situate, becomes the more precarious. Tares, which form so valuable a resource for feed, are imported to the amount of two-fifths of the consumption from abroad, and the heavy duty of 10s. per quarter checks considerably the cultivation of the article. In reviewing the duties on some articles of seed, the heavy tax renders their admission quite prohibitory ; on clover, trefoil, lucerne, and all grass seeds, the duty is 20s. *per cwt.* ; on caraway, 30s. ; canary, 60s. ; coriander, 15s. ; anniseed, 60s. ; mustard, 8s. *per bushel* ; tares, 10s. *per qr.* ; on crushing seeds the duty has been reduced to 1s. per qr., as they do not interfere with the agricultural interest, the consumption of rape-seed, linseed, and hemp-seed, being almost totally dependent on foreign growth. These various points were urged with much ability by Mr Mackenzie, member for Ross-shire, on presenting a petition, during the early part of March, from some agriculturists in the northern districts of Scotland, praying for relief, and especially alluding to the duties exacted on the import of grass seeds. The speech of the honourable member was listened to with attention, but the press of other important business before the House, precludes the chance of the subject being further debated this session, though the opinion prevails,

that on the next meeting of Parliament, if the question is pressed forward, the government would be inclined to accede to the proposition. In reference particularly to Scotland, it has been very judiciously remarked, that the doctrine of protecting duties does not apply equally to clover-seed as to corn, for this reason, that the quantity of seed annually secured in Scotland does not exceed a few tons. This is not owing to the want of protection and encouragement; as, in addition to the heavy protecting duty, the Highland and Agricultural Society, and other local institutions, for several years offered handsome premiums to the most successful cultivator of clover seeds; but the result of the trial served to shew, that the climate of the country was not favourable for the purpose, and the seed saved was not only inferior in quality, but the crop was less profitable than the usual rotation, and proved a great scourger of the soil. The well known fact of seed grown under a favourable climate for ripening it, being always more productive than native grown, is peculiarly the case with clover seeds, and therefore the attempt to extend cultivation has always met with the ill success which follows the endeavour to strive against natural difficulties.

A similarity in the character of the weather has prevailed throughout the United Kingdom; the same description, therefore, will apply in great measure to the appearances of the winter-sown corn in England, Scotland, and Ireland. The young wheat, during December, assumed a promising appearance, and though the frost was severe in England during the middle of the month, the plant managed to maintain a healthy appearance. In the course of January, the weather was very changeable, but the frost had a beneficial effect on the land, in rendering it friable, and more accessible to the influence of air and water, besides proving destructive to various grubs and insects. The cold was sufficient to check vegetation, without endangering its vitality, and the wheats were thus prevented from evincing any symptoms of becoming *winter-proud*, but looked good in colour, beginning to spread on the ground, and becoming curly. The commencement of February was moist and foggy, yet the rain did not much impede the progress of sowing and general field labour, so that a greater quantity than usual was got into the ground in the course of the month. Wheat appeared backward, though strong and healthy, without being exuberant, and its being stunted in its growth, caused it to be reported thin on the ground. March preserved its characteristic, and came in boisterous and windy, but accompanied with rain, and the temperature as chilly and unfavourable for vegetation, as the wet was to the process of sowing. After the 18th, however, a material alteration ensued; the mildness of the nights, and the sunny atmosphere of the days, had a most invigorating effect on the tardy state of vegetation; and

seldom has so pleasing and animating an effect been witnessed in scenery,—the influence was almost magical, and all nature seemed to at the happy transition. The duration of this agreeable change was, ever, only temporary. The sowing of Lent corn was still unfinished; on the poorer soils, wheat looked less favourably than could have been expected; since which the weather has been very unsettled, and trying for young plants,—the temperature cold, raw, and ungenial, with falls of towards the beginning of May, and, on the very verge of the month surface of the ground was hardened by frost, and, in some places, strong ings of ice appeared on stagnant waters,—the thermometer, in the environs of London, having receded five degrees below the freezing point on the 30 April. In exposed situations, on clayey and strong soils, the wheat, in the early part of this latter month, exhibited a stunted and sickly appearance, and, on damp raw land, the edge of furrows, and undrained hollows, the blade was turning off yellow; and many grounds were in too moist a state to receive the seed. About the middle of April, the reappearance of sun had a most renovating influence: the wheats began rapidly to assume that healthy green,—the sure index of vigorous growth,—tillering out steadily, not shooting up spindly, but covering well the ground, while the sowing brought nearly to a conclusion. It was reported, that, in Lincolnshire, and parts of Cambridgeshire, the *wire-worm* had exerted its destructive power over the wheats, but, on inquiry, we find no corroboration of the statement; indeed, for the last three years, the ground has not been so free from wire-worms, insects, grubs, &c. as the present. The latter part of April was unusually cold and disagreeable, and the first days of May were wet, windy, and unpropitious for the farmers; and the wheats on clayey, strong, cold, and low lands, were beginning to appear sickly and yellow, and, in many places, shewed evident symptoms of being affected by the character of the season. The weather, however, again improved; and the wheats are regaining a healthy aspect, but still patchy, and excessively backward in their growth. The early sown barley has reared its head strongly above the surface, as well as oats, beans, and pease; but the latter, in many places, look yellow, and the former are generally fresh and tolerably vigorous. It cannot, however, be denied, that germination throughout the current year has been materially impeded, especially in the northern parts of England, in Scotland, and in Ireland; and, in the latter island, the sowing of spring corn has been protracted to an unusually late period; but, under the mild influence of May, the plants being healthy at the root, possess full power to shoot luxuriantly, and retrieve much of the time that their vegetative faculties have lain dormant; and, with a succession of favourable weather, it is generally estimated that there is sufficient plant to produce a fair average per acre. Though there is some concurrence in representing the breadth of wheat sown this season, especially in England and Ireland, as much less than in former years, particularly in the English midland counties, the circumstance being generally attributed to the low price of wheat, and the failure in the crops of turnips, having prevented farmers breaking up land they otherwise would have done; on the other hand, considerable more land has been cultivated with barley, owing to the extensive consumption of the article for malting, distilling, and for

and the high price it has realized, compared with other grain, and which is particularly applicable to Ireland. In Scotland the fallow wheats look unfavourably; and the wheats on strong clayey soils have assumed rather a sickly and yellow appearance, occasioned by the combination of snow, rain, and ice, which have alternately prevailed to an advanced period of the season. Though the season indicates a later harvest than has been experienced since 1817, yet the plant is alive to any improvement in the weather to make rapid advances in its growth. In Ireland, the diminution of land sown with wheat is estimated at nearly one-third of that of last year, much of the ground being occupied with flax, the culture of which has been widely extended in the north and north-eastern parts of the country; the whole amount of land under this cultivation being estimated at 120,000 acres. Throughout the kingdom, therefore, we are likely to experience a protracted harvest, and an irregular crop of spring corn, owing to the intervals which have elapsed between the sowing, thus endangering the condition and quality of grain in the more northern parts of the country.

The depression in the prices of wheat, which, previous to the late advances, had so long characterised the trade, was much contributed to by the absence of all speculative demand, leaving the ample supplies continually appearing at market, and which exceeded the immediate wants, to be worked off at rates almost at the option of the millers; and no extra relief beyond the consumption being afforded the trade, the consequent result ever attendant on a surplus supply was a constant decline in the value of the article; and heavy and numerous losses have been thereby sustained. The incentive to investment in grain was destroyed, and speculation became paralyzed. During January, however, a slight reaction was visible. The low currency wheat had attracted at last a speculative attention, which added to its extensive consumption for human as well as animal food, and the consequent demands on the stocks, which were principally in the hands of the larger farmers, the landlords, or of merchants. The increased sale also in consequence of the full employ of labour in the manufacturing districts, concurred in communicating their influences on the prices. The currencies continued gradually to improve until the middle of February, when the quotations exhibited an advance of 6/ to 7/. Increased supplies caused a temporary depression of the rates; but during the early part of March, the receipt of orders from Ireland, Liverpool, the north and west of England, and from Scotland, had the effect of encouraging holders to demand higher terms, which in many instances were acceded to. The granaried parcels having been withdrawn from the market, and the supplies proving inadequate to meet the demand, the general currencies sustained a farther enhancement. Towards the close of the month and the beginning of April, an additional improvement took place in the prices, and both red and white wheat arrived at their maximum range. Essex, Kentish, and Suffolk red qualities being noted at from 48/ 50/ to 52/, and white 56/ to 58/ and 60/ as an extreme point, exhibiting a rise of 12/ to 14/ both in red and white samples, calculating from the lowest point of 1835, which was during the weeks ending the 7th, 14th, and 21st of September, when the top currencies of red wheat were 37/ to 38/, and of white 42/ to 44/. The improvement from the 1st of January

has been 11/ to 13/ per qr., since which prices have fluctuated according to the barometer, and have become much earlier than usual weather markets, receding 4/ to 5/, again rallying and regaining 2/ to 3/, but not arriving at the extreme quotation within 1/ to 2/ per qr.

At the commencement of the year the continued improvement in the prices of wheat and flour in the United States of America, owing to a failure in the crops, attracted speculative attention; but the offers were, however, generally too low to induce holders to quit their stocks. Speculators having retained their wheats to so lengthened a period, preferred waiting a little longer the issue of events, rather than submit to the heavy loss which they must then have made in order to realise. During January some Barletta wheat was sold at 26/, some fine Neustadt at 26/, and old Danzig at the same rates. In the beginning of February the reports from New South Wales proving extremely unfavourable, and prices being quoted at 13/ to 14/ per bushel, and subsequently at 16/ and even 20/, some speculative purchases were effected for shipment to this distant part of the world. Danzig wheat enhanced in value 2/ to 3/, obtaining 28/ to 32/. Baltic red being firm at 26/, and Danish at 24/; but though the enquiries for the article were at first entirely actuated by the intention of shipment either to the United States or New South Wales, yet in the course of March some speculative feeling was directed towards the finer qualities of Danzig, as well as selected parcels of lower Baltic red wheats, with the view of holding them; and holders succeeded in obtaining more money for the better qualities, Danzig being noted at 35/, and Baltic red 28/. Several orders were also transmitted abroad, principally to Danzig, Stettin, Mecklenburgh, Holstein, and Hamburg, with the view of keeping the wheat in granary on the spot, the charges being so much lower, taking the chance of realizing a profit by the resale in loco, where the speculator was early in the market, or as the stocks of bonded wheat were being much diminished in England, to be enabled to replace them on the approach of any demand for the home consumption, as the foreign prices ruling low, were liable to be materially influenced by the continued advances in the British markets. The advices from New South Wales stating that the appearance of the crops having improved, and the market being better supplied, wheat here receded to 9/6 and 6/ per bushel, and checked the speculative shipments; but to New York, Boston, Baltimore, and Philadelphia, exports have still been made; the prices remaining firm for Danzig wheat, and the finer samples of Upper Elbe being held at 30/. A few shipments have been also made to Canada, France, &c. The total amount exported from the United Kingdom for the four first months of the year has been about 63,000 quarters.

In the course of April, Mr Robinson, the member for Worcester, submitted a motion to the House of Commons, founded on the memorial forwarded to the President of the Board of Trade, and laid before Parliament last year, as noticed in this journal in the December quarter, as having been presented by Mr Collier, member for Plymouth, from the merchants and corn-factors of Plymouth, Liverpool, London, &c. for permission to grind foreign wheat in bond into flour, and for its manufacture into biscuit for exportation. The honourable member was desirous of having a select committee appointed to inquire into the restrictions necessary to be adopted to carry this design into

execution without prejudice to the revenue or the agricultural interest. Mr Poulett Thompson, however, again mooted the objections which have been raised against the measure, that great difficulty would arise in preventing illicit manufacture and transactions, and that the privileges of the agricultural interest might be infringed, if the act of 1824 was renewed, which allowed flour of the home produce to be "substituted for foreign wheat secured in warehouses," or that for every seven quarters of bonded corn one ton of English flour should be placed in the bonded warehouse, until released by the same amount of flour converted from the bonded wheat; thus inferring, that the agriculturists would not be injured, because a certain weight of home growth of flour would go under lock, and let free the same amount of foreign produce, with the advantages of British labour being employed on the raw material. By this arrangement Mr Thompson argued, that from experience it was found fraud would not be sufficiently held in check, but added, he was willing to introduce a bill *authorising the manufacture of bonded wheat into flour for export*, without any substitution of the home growth; so that he would ensure the corn so manufactured should be sent abroad. Though this principle might be carried into effect by the establishment of bonded mills, or mills attended by custom-house officers for the sole purpose of grinding foreign flour, yet the quantity required to be manufactured is comparatively small, and not of sufficient consequence to support a mill, and if ground at only specified periods by certain mills, would occasion great inconvenience, attended with extreme difficulty in preventing fraud. The select committee was refused, and the subject referred to the agricultural committee, and the petitioners are inclined to hope that the subject will meet a favourable consideration, as the interests of the growers of British corn are not in any way implicated. Little difference of opinion can prevail, that the adoption of the measure would be attended with beneficial results, in creating a new branch of trade for the British miller and biscuit-maker, by which a considerable capital, together with much additional labour, would find employment, liberating, at the same time, a quantity of corn which, in many instances, is not only rapidly deteriorating in quality in the granaries, but is being entirely destroyed by weevils.

The improvement in the wheat trade has enabled millers to obtain more than a corresponding advance in the price of flour; the town-made qualities having on the 1st of December been noted at 35/ to 38/ q sack, and have gradually risen to 45/ and 48/. Bonded flour has experienced an animated demand for export to the same destinations as the wheat, with the addition of several shipments to the West Indies, where the receipts from America, whence the West Indians draw the most of their supplies, have been considerably diminished. The short stocks, however, on hand, and few arrivals having been received from the Baltic or Elbe, prevented much extent of business being transacted; prices having advanced about 3/ q barrel, Danzig marks being noted at 24/, and American 26/ q 196 lb. The export of flour from the United Kingdom during the four months of 1836 have been about 69,000 cwt.

Though the crop of barley has been abundant, yet the immense increased ratio of the consumption both for malting and distilling, and in consequence of the want of feed for animals, the quantity that has been required for grinding purposes, has caused the supplies already to evince symp

92 RETROSPECT OF THE BRITISH AND FOREIGN CORN TRADE,

exhausted stocks. From the 1st of December 1835 to 1st May 1836, the arrivals into London from the English coast have been 184,480 qrs.; from Scotland, 19,862 qrs.; and from Ireland, 2523 qrs. In reviewing the gradual increase in the consumption of malt in London and its vicinity, as annexed, it has become of material importance, that not only the yield of the grain should be productive, but a greater breadth of land cultivated with the article, and which the high relative price barley has borne, has induced many farmers in the United Kingdom to have recourse to; more particularly when the inquisitorial and unjust character of the law relative to malting, forces the maltster to select only the most kindly qualities, which will malt within the period prescribed by the excise. The following is the quantity of malt consumed in London and its vicinity during the last five years :

1831.	1832.	1833.	1834.	1835.
622,549 qrs.	604,477 qrs.	588,688 qrs.	662,713 qrs.	699,990 qrs.

And the consumption of malt in the United Kingdom has augmented fully in proportion. The estimate is made from the 1st of January each year.

1833.	1834.	1835.	1836.
4,748,375 qrs.	5,064,625 qrs.	5,082,750 qrs.	5,663,750 qrs.

The currencies of barley having maintained a higher proportionate value than wheat, have not participated to the extent of the advance in that article; though common malting descriptions have improved 3/ to 4/; chevalier, the same; distillery sorts, 5/ to 6/; and grinding, 4/ to 6/ per qr.: prices of Norfolk and Suffolk samples having been 35/ to 36/; chevalier, 38/ to 40/; extra fine for seed, rather higher; distillery, 32/ to 34/; grinding, 30/ to 32/. Several parcels have been exported from bond, especially from London, and nearly the whole have been cleared off the market for shipment, principally to the United States and Portugal. Good Danish and Holstein barley has realized 18/, and that amount has latterly been refused for a good fresh sample. The exports, during the first four months of this year have been 13,388 qrs., chiefly from London, and the stocks have become extremely limited. Prices in the Baltic remain high, say 14/6 to 15/6 per qr., and the crops inferior to that of 1834-5; but as many speculators are sanguine that before the harvest grinding barley will be worth 35/ to 36/ per qr.; which would impose a duty of 12/ to 13/, provided the averages advanced in proportion. It would therefore appear not improbable that a small importation may take place.

The oat trade has afforded considerable disappointment to speculators, as the prices in Ireland, owing to the establishment of the agricultural banks, which we shall have occasion more particularly to allude to, has enabled the farmers to command the markets, and the quotations, in consequence, have ranged too high, comparatively with the English rates, to admit of much lucrative business being transacted. In comparing the importations of the article since harvest to the 7th of May, in the years 1834-5 and 1835-6, it appears that there have been received in the port of London :

	English.	Scotch.	Irish.	Total.
Michaelmas 1834, to 7th May 1835, }	54,128 crs.	225,708 qrs.	514,114 qrs.	793,950 qrs.
Michaelmas 1835, to 7th May 1836, }	132,396	88,842	340,370	561,608

exhibiting on the aggregate this season a diminution of 232,342 qrs., having imported 136,860 qrs. less from Scotland, and 173,744 qrs. less from Ireland, though from England there is an increase of 78,268 qrs. It would therefore appear that the crop of oats in England, considering that the quantity sown last year was less than usual, have been very productive, which, added to the substitutes of barley and wheat in feeding horses, has considerably diminished the consumption of the article, in addition to the fact, that parts of the coast which were accustomed to import from London, have received cargoes from Ireland direct; and the London quotations have ruled generally too low to tempt many additional consignments or shipments from Scotland or Ireland; though the inference would remain, that the supplies in Scotland, and particularly Ireland, are still large; and when the causes which have operated in enabling farmers to withhold their stocks in Ireland have partially ceased to influence them, and the ensuing harvest promises an average growth, we are likely to have an influx of the article, which will check any further enhancement. On the 1st of December, the prices of English feed oats were 18/ to 21/; extra, 22/; black, 18/ to 22/; short small, 20/ to 23/; Polands, 21/ to 22/; fine, 23/ to 24/. On the 6th May the quotations were, feed, 24/ to 25/; extra, 26/; black, 24/ to 26/; short small, 26/ to 28/; Polands, 25/ to 26/; fine, 27/ to 28/.

Dec. 1. 1835. Scotch Common, 18/ to 25/ Potato, 21/ to 23/ Fine, 25/ to 27/
May 6. 1836. ... 25/ to 26/6 ... 27/ to 28/ ... 29/ to 30/

Dec. 1. 1835. Irish feed, 15/ to 17/ Black, 16/6 to 19/ Potato, 18/6 to 21/6
May 6. 1836. ... 21/ to 23/ ... 23/ to 24/ ... 24/ to 26/

The rise in the prices has been principally on the secondary and inferior samples of new, which as the season has advanced have improved in condition, as the quality generally was good: this applies especially to Scotch parcels, the weather for the receiving of the crop having in many instances proved unfavourable, the oats came to hand soft and weathered. There have been various fluctuations during the above period, and much languor has prevailed in the market, as dealers and consumers have refrained from purchasing beyond their immediate wants, in constant anticipation of increased supplies. The inferior English have improved, however, in value 5/ to 6/ per qr., and the best sorts 3/ to 4/; while the lower samples of Scotch have sustained an improvement of 6/ to 7/, and the better parcels 1/6 to 3/; Irish 5/6 to 6/6 per qr. throughout. In bonded oats several purchases have been effected for shipment to the United States and West Indies, and prices have advanced from 9/ to 11/ per qr. for Danish and Swedish quantities to 14/ and 15/, which latter price was lately paid for Danish. Prices in the Baltic and Sweden range higher, and as the stocks in bond are still considerable, there is little probability of an importation being required from abroad.

Old beans having been scarce, and new beans secured in excellent condition, the article has experienced a steady demand at improving rates, which have advanced 3/ to 4/ per qr. Beans have been bought freely at Hamburg, Bremen, and in Friesland, for English account, at from 20/ to 22/. In bond

the article would now realise 28/ for fine pigeon; and it is calculated the duty may recede to 13/ before harvest.

Pease have fluctuated much in value: white boilers were in request during the cold weather, and progressively advanced from 39/ to 45/; an increased demand has been also experienced for good heavy qualities for feeding lambs, owing to the scarcity of feed, and in a few instances have been ground up by the millers with inferior and ill-conditioned wheats. Feeding pease have also latterly met a steady rate; maple and grey at first declined from 33/ and 34/ to 30/ and 32/, but have since rallied, and are now worth 34/ to 36/. Some purchases have been made in the Baltic and Elbe, the quality the last year having been sound and dry, but rather small. Small parcels in bond are now worth 25/ to 28/; the duty has receded to 14/, and is expected by some speculators to be 3/ lower. In the upper Baltic ports pease have been bought at 16/ to 17/, and are at present held at 21/ to 22/. The alterations in the averages are as follows:—

	Wheat.	Barley.	Oats.	Rye.	Sen.	Pease.
Dec. 4. 1835,	36/9	29/3	18/11	30/10	35/9	34/9 per qr.
May 1. 1836,	48/3	32/8	22/2	31/2	36/11	40/9 ...
Improvement per qr. during the 5 months,	11/6	3/5	3/3	0/4	1/2	5/10

In *Scotland*, we have before noticed that the same kind of unseasonable weather has predominated as has been prevalent in *England*; wind, snow, and rain, have alternately exerted their influence, with opportunities “*few and far between*” for vegetation to receive the vivifying powers of the sun’s rays; thus the exertions of the farmer throughout the United Kingdom have been continually subject to harassing interruption, and previous preparations of the ground have been rendered often fruitless, and the extra labour incurred has in many instances been attended with much additional expense, with the prospect also of an irregular and tedious ripening of the crops, and consequent hazard, in the more northern situations, from the probable protracted period of the whole of the grain arriving at maturity,—of material injury being sustained in the quantity and condition of the sample. Less wheat than usual is sown this season, owing to the low currencies of late obtained; and though the crops of this grain throughout *Scotland* averaged a moderate produce, yet the yield has been inferior in quality, and the quantity of flour for the bulk less than was at first anticipated; and notwithstanding the supplies drawn from *England* for admixture, yet the demand continues at the principal markets of consumption, and prices have progressively advanced, until the difference in the currency, compared with the quotations on the 1st of December, are considerably in favour of the grower, and fully equals the enhancement experienced in *England*, and on barley and oats ranges even higher. The increase in the value of wheat in *Edinburgh* has been 12/ to 13/ per quarter; of barley, 8/ to 10/; potato oats, 4/ to 5/; common do. 3/ to 5/. At *Glasgow*, English and Scotch wheat exhibit an advance of 5/ to 7/ per 240 lbs.; Irish, 5/ to 6/; Irish flour, 5/ to 6/6 per sack; barley, 1/6 to 3/ per 320 lbs.; Irish do. 3/6 to 4/6; Irish oats, 1/6 to 2/6; and Scotch, 1/ to 2/6 per

264 lbs.; Irish oatmeal 4/, and Scotch 5/, per 280 lbs. At *Berwick*, wheat has realized 11/ to 14/ per qr. more money; barley, 3/ to 8/; potato oats, as well as common qualities, 4/ to 5/ per qr. At the principal shipping ports to the *northward*, wheat has risen from 10/ to 12/; barley, 3/, 5/, 7/, to 9/; oats, potato, 3/6 to 5/6 per qr.; and the common sorts of feed, as their condition has improved from keeping, exhibit a greater difference in their cost, inferior qualities obtaining 5/ to 7/ per qr. more, and the better parcels 3/6 to 5/. It is estimated that there is still a considerable portion of wheat remaining on hand; but of barley the stocks being fast exhausted, and of oats they are also much diminished; and though the supplies to the west of Scotland from Ireland have been considerable, yet the demand continues, and prices consequently fully supported, and many consignments have been forwarded to this part of the country in preference to London, or even the English Channel ports, as the state of the markets have there worn a more profitable aspect.

With the exception of wheat, the farmer has reaped a fair return for his barley, oats, beans and pease. Wool has also during the last twelve months been selling at high prices; and in many districts where the facilities afforded by steam have been taken advantage of in forwarding live-stock to the London markets, good profits have attended the transaction; indeed, had it not been for this extensive supply of beasts, the price of meat would have risen in the metropolis much more exorbitantly than it has done. We should, therefore, be inclined to balance the account of late in favour of the farmer and grazier in Scotland, though not unmindful he has been previously depressed, from many of the causes which have operated more heavily on the English agriculturist.

In *Ireland*, a sudden, but at the same time important, revival of the agricultural interest has latterly taken place; and though, it is to be feared, that to a certain degree the means adopted to afford temporary relief to the farmer may be ultimately attended with less beneficial results than those anticipated, yet the immediate consequences have had the tendency of materially alleviating his distress, by the competition excited among the *Joint-stock Banks*, and the establishment of several local banks, termed *Agricultural Banks*, which, having the power of issuing as much paper currency as the necessity may require, are enabled to act with the greatest liberality in affording pecuniary assistance in small sums, many of which range from L. 5 to L. 20, to the actual cultivators of the soil; but, it must be added, communicating thus a *fictitious stimulus* to the value of agricultural produce. By these arrangements, the smaller occupiers of land have been prevented from being compelled to dispose of their produce to merchants resident in the principal sea-port towns, either directly or through the medium of agents, without regard to the rate of the currencies, giving them at the same time the power of controlling the markets; what has been of late proved, by the scanty supply which has been received through this diffusion of capital, and which, in addition to a progressive but general improvement in the condition of the people, has considerably influenced the local demand for the coarser descriptions of flour, even to the partial exclusion of the previous standard article *oatmeal*, and increasing the home consumption of wheat in a most extraordinary degree, while the demand for barley has been likewise much augmented for

distillation. Though no attempt ought to be offered in restricting any means likely to afford an effectual and permanent source of relief to the Irish agriculturist, yet it is matter of deep consideration, that the system patronised in the sister kingdom will not conduce to any ultimate and sterling benefit, as ephemeral measures with a country are always hazardous. Should, however, the intentions of the promoters of the experiment be persevered in with success, and conducted with due caution and sound discrimination, it may have the desirable effect of stimulating the smaller tenants, who have never enjoyed such an extent of credit, to apply with renewed energy in their pursuits, and to increase the cultivation of their fertile country on improved and scientific principles, and open new channels for the advancement of agriculture, but which must emanate more from the character of the individual, than the accession of accumulation of capital. It is, however, to be hoped, it may lead to an important revolution in the whole of the agricultural population. At present, it has doubtless created a vast change in the Irish grain and provision trade, and produced the anomaly of advancing the prices beyond the currencies of London and Liverpool. It must, however, be recollected, both by merchant and farmer, that the intimate relation existing between supply and demand, must ultimately influence the aggregate average of prices, which will eventually resolve themselves into the same result, at whatever period of the season the produce may be sent to market, as the rate of profit in the end will average the same. If farmers can continue to dole out their stocks at pleasure, until the ensuing harvest, their point individually will be temporarily gained; but if any check is experienced in the constant flow of *accommodation*, the influx of grain upon the markets will cause a serious depression,—a result which should not be allowed to escape reflection. As we at first observed, however, a general improvement is becoming apparent in the condition of the agriculturists in the northern and eastern divisions of the island; but in the western and north-western portions the march of improvement proceeds too slowly, and even now many parts are being threatened with famine, and have required the timely assistance of Government to save the peasantry, and even the cattle, from starvation. An able contemporary has justly remarked, that it is most interesting to observe the different shades of civilization, which are to be witnessed where the natives have been encouraged to pursue industrious habits, and where the want of employment has left them inactive and ignorant: in the former case, a few acres are advantageously cultivated, and produce food for hundreds; in the latter hundreds of acres only support a few head of cattle, or supply firing to a comfortless and impoverished population. At Limerick the import of fine seed wheat has been this season extensive; and if the millers pursue the same liberality for a few years which has lately actuated them, of importing and selling without profit, it may be reasonably expected that, from the frequent change and constant improvement in agriculture, the farmers of this district will produce as fine samples as those met with in the northern counties.

The crops of wheat throughout Ireland, and particularly in the north, were not only below an average produce, but much deteriorated by the wet weather during harvest, and the rains experienced during the digging of potatoes created serious apprehension as to their keeping, and added to the deficiency

In many parts in the yield, especially in Connaught and Ulster. These circumstances caused at the commencement of the year an increased demand for oatmeal, and as the condition of the farmers, especially who had cultivated flax, had been much improved by the high prices realized for the article, the stocks of oatmeal began to accumulate, as a favourable opinion was entertained of it; and the prices paid by the millers for mealing oats, were ten to fifteen per cent. higher than the currency that could have been obtained in London. The demand from the distillers for grain of all descriptions, has been unprecedented, and as barley, having found rapid consumption for making and grinding, besides distiller's purposes, began to fail, the inferior wheats and oats of all qualities were made use of by them. Flax is superseding the growth of wheat to a considerable extent, particularly in Ulster and throughout the whole of the northern division of the island, so that wheat in these districts is no longer sown as a crop. The quantity of land under flax is now estimated at 120,000 acres, having in a few years quadrupled its amount; and the quality of the production is much in favour both with English and Scotch spinners. The alteration in the prices of grain since the 1st of December has been very great; in January the trade evinced symptoms of improvement, since which the quotations have gradually been enhanced, until they manifest an increase of 10/ to 11/6 per barrel in wheat; barley, 2/6 to 3/; oats, 2/ to 3/6 on the general currencies; but in good shipping oats, in execution of free on board orders, prices have not advanced more than 2/6 per barrel, oatmeal 2/ per cwt., and flour 10/, 12/6, to 15/ per sack as in quality. Riga flaxseed has attracted more attention, and has consequently sustained the greatest advance, being from 4/ to 4/6 per barrel. The extensive home consumption of wheat, and large supplies shipped to Liverpool and the manufacturing districts, have reduced the stocks to a low amount. There is also little barley remaining on hands; but of oats there is still some quantity left to come forward, though not in the proportion that the deficiency in the exports to London would imply, as the shipments direct to other ports of the coast of England, as well as Scotland, have been larger than usual.

In conclusion, it may be observed, that if the statements are generally correct as to the diminution in the cultivation of wheat in England, Scotland and Ireland, and the consumption continues equal to the present ratio, prices are likely to receive an additional impulse after the ensuing harvest, even should the crops prove a full average produce per acre, and as regards the prospects of the trade until the harvest, the general opinion is setting towards advanced prices, which of itself will have some effect, more particularly when we consider the amount of money in circulation, and the revived spirit of speculation.

The advices received from *New South Wales* and *Van Diemen's Land* during March, dated 19th and 24th of September and 2d October, stated a continued increase in the prices of wheat at Sydney, owing to the drought and apparent destruction of the crops, and which advanced as high as 16s. per bushel, and for fine samples, even as high as 18s. and 20s. were paid, and for flour, 43s. to 45s. per 100 lb. From Hobart Town and Launceston large supplies were sent to Sydney, which caused the quotations to rise at these towns to 11s. and 12s. per bushel; but at Sydney towards the end of October and be-

8 RETROSPECT OF THE BRITISH AND FOREIGN CORN-TRADE

gining of November rain was most opportunely experienced, and the crops, particularly those late sown, were astonishingly revived, and assumed an appearance which has induced the hope that little additional importation would be required. The currencies consequently rapidly receded, and wheat was contracted for, deliverable in April, at 7/ per bushel; at Hobart Town, the rates were 7/ to 8/. The destruction, however, in New South Wales of cattle has been severe, from heat, disease, and want of fodder; of sheep alone, the loss was estimated at 10,000.

In *Canada*, the demand which had prevailed in the United States for wheat and flour had prevented any decline taking place in the quotations, and in the Upper districts the farmers have been transacting a lucrative business with the Americans, who have taken off large parcels of wheat and barley at remunerating prices, though the duty on the admission of the former article is 25 cents, or 1/3 per Winchester bushel. Lower Canada red wheat has remained firm at 4/6 to 5/6 per *minot*, an old French measure 5 per cent. larger than the imperial bushel, but few samples of Upper Canada quality were offering. Barley has been held at 3/2 to 3/4 per *minot*; oats, 1/10; rye, 3/3 to 3/5; superfine flour, 32/6; fine, 30/ to 31/, which was an advance of 1/ to 1/6 per barrel of 196 lb. since January. The report, however, having reached Montreal, that large shipments were intended to be made to Canada, and the uncertainty which existed as to the quantity of foreign wheat likely to be imported by the spring ships from our bonded warehouses, had rendered speculators cautious, and the transactions were in consequence to a limited extent. Fears were also apprehended, that should an act of Parliament be passed authorizing the manufacture of bonded corn in flour in England for exportation, it would have a serious effect on the trade in Canada, as flour could be then exported from England to Halifax or the West Indies at a cheaper rate than from either Quebec or Montreal.

In the *United States of America*, the flour and grain trade has experienced much animation, in consequence of an advance in the prices of flour at the very commencement of December, and an opinion prevailing, that the crops of corn throughout the States were considerably less than an average, and even at that early period was drawing to a conclusion, added to the fact, that the crops of old wheat had been previously exhausted, particularly in Ohio, a great grain growing and manufacturing district. Towards the middle of December, the calamitous fire which occurred at New York on the 16th being so extensive and ruinous in its devastation, checked for a time the speculative feeling; but commercial confidence was soon restored, and prices have since continued to advance, particularly of wheat and flour, which have induced large shipments from England, as well as from the Baltic, Elbe, and Weser; but prices have exhibited little or no impression from the importations hitherto received. Danzig wheat has obtained 55/, other qualities 44/4 to 54/, as in quality, and a parcel of white wheat from Liverpool realized 56/ per qr., the duty being equal to 10/ per qr. per Winchester measure. At New York Western Canal flour has improved 8/ per barrel; wheat about 4/8 per qr.; Russian, Prussian, Dutch, and Belgium rye, has realized 36/8 to 37/10, being an improvement of about 3/ per qr. At Baltimore, Philadelphia, and Boston,

flour has not participated to the full extent in the advance at New York; and 4/6 per barrel is the extreme range of the fluctuation. Wheat has risen from 4/10 to 5/6 per qr.; rye, 3/ to 5/5 per qr.; oats, 2/6 to 5/ per qr. Most of the English shipments of oats have not obtained more than 22/ to 24/6; but fine parcels were worth 27/6 at New York. The barley received from England having been inferior, has not, with one or two exceptions, fetched more than 22/.

In *South America*, fresh restrictions have been imposed on the admission of flour; at Monte Viden, the duties had been advanced three dollars per barrel; and at Buenos Ayres the import of the article from abroad was prohibited from the 1st of last January.

In *France* the weather has been extremely variable in different parts of the kingdom; for instance, from Languedoc complaints have been made that the crops were suffering from the want of rain, while in the neighbouring departments the rain has been almost incessant; and frosty, cold, and moist weather has prevailed to an unusually late period. Vegetation is, in consequence, extremely backward; but the severity of the season has not effected any marked difference in the prices, as it is justly thought that a check being given to the luxuriance of the crops is often salutary, the warmth of May soon retrieving the time that the growth of the plant has been retarded. In Burgundy, Champagne, in the Northern Departments, in Lower and Upper Normandy, in the Eastern Districts and those of Orleans, the country round Nantes, Bordelais, towards the Pyrenees, in the environs of Toulouse and Narbonne, and in Provence, and especially along the course of the Rhone and Saone, the prices, particularly of the finer descriptions of wheat, have continued to improve with an extensive demand, either for local consumption or exportation to the more southern departments. At Marseilles the stock of free wheat is entirely exhausted; and, except during the blockade of the French coast during the last war, the city and environs have not been so destitute of supply, the government being even obliged to export wheat from the northern departments to supply the garrisons on the frontiers of Spain; and at Bayonne and the neighbourhood, all the grain and provisions find ready sale to the *Carlists* at good prices. On the Rhine, sudden transitions from heat to cold have been experienced, but the crops generally are reported favourably, except of rapeseed, the plants here, as well as in other parts of France, having suffered severely from the protracted cold weather and the alternate changes they have had to undergo. The prices at Marseilles have ranged high; the wheats from the Loire, whence the chief supplies have been received, are noted at 50/4; Normandy qualities generally 49/3. The law prohibiting the manufacture of Barletta wheat into flour for export, has given considerable umbrage to the merchants, as the Odessa wheats, which are now substituted, produce an inferior quality of flour, and require mixture. Owing to these new restrictions, the Neapolitans are availing themselves of the advantage, and exporting Barletta flour into Algiers. This species of flour is of superior quality, and the growth of this wheat might be an acquisition to this country, as at Grignon successful experiments have been made in its cultivation; and at Paris the fine samples have obtained 18/ per qr. more than the native growth. The general aggregate price

of wheat has advanced from about $32\frac{3}{8}$ to $35\frac{8}{8}$, calculating from the 1st of December to the middle of May. At Marseilles, Toulouse, &c. the average has advanced from $36\frac{4}{4}$ to $40\frac{5}{5}$. At Paris prices have sustained less fluctuation; on the 1st of January best red wheats were noted at $34\frac{4}{4}$ to $35\frac{5}{5}$ —are now held at $34\frac{4}{4}$ to $35\frac{10}{10}$ per qr.; and it occurs that the duties at those markets where the greatest demand is experienced, are still too high to admit of foreign imports; the difference in the averages arising from the classification of the average prices in certain specified departments according to the growth of corn and facilities for obtaining it. Thus at Marseilles, Toulon, Cette, &c. the regulating average price for this month is $40\frac{5}{5}$; but foreign wheat cannot be admitted in that section under $28\frac{10}{10}$ per qr. if imported in foreign ships, while the averages of the second section of the fourth class, which includes the ports of Cherbourg, Granville, St Malo, St Brieux, Brest, Lorient, and Vannes, all parts in fact from the department of Calvados and Cape Barfleur to the river Volaine in the Bay of Biscay, though considerably lower, yet foreign wheat can be admitted at these ports at a duty of about $10\frac{7}{7}$ if imported in British ships, and about $7\frac{7}{7}$ if in French ships. It is therefore necessary, if exports are made from this country to the Mediterranean ports, for the vessels to be chartered with the agreement, that they touch at Cherbourg or one of the above named ports, and having had their cargoes entered and paid duty, to proceed afterwards to Marseilles.

The prices of grain in the *Italian* markets have sustained little variation, except at Naples, where wheat and oil are articles of speculation, in some degree similar to the funds in the London Stock Exchange. Barletta wheat was at first depressed, on its exclusion from the French Mediterranean ports, since which it has rallied, exports of the flour having been made to Algiers, and some mills have been erected, under the patronage of Government, for grinding Barletta wheat, and the flour produced is entering into competition with that of the French millers in the French African ports. The reports, however, from Puglia, stating the favourable aspect the wheat had assumed from the late rains, had depressed the market; and prices which were noted at $25\frac{5}{5}$ have receded to $22\frac{5}{5}$ and $23\frac{5}{5}$ at Leghorn; the growing wheats are represented as promising, and the trade ruled dull. Though good Tuscan white wheat was had at $45\frac{4}{4}$, and red at $39\frac{8}{8}$, Egyptian beans $20\frac{8}{8}$, the wise and politic measures adopted by the government of Tuscany in remitting the duties on the import of foreign goods, was represented as having had a very beneficial effect on commerce, and reviving the mercantile importance of the city. At Genoa and Trieste the transactions in grain have been confined to the local wants.

In the *Black Sea* prices of wheat have, during the current year, rather improved. At Odessa good hard wheat was held at $22\frac{4}{4}$ to $22\frac{11}{11}$, and soft at the same rates, extra fine being $23\frac{7}{7}$; but for June delivery the rates were $3\frac{5}{5}$ to $4\frac{5}{5}$ per qr. cheaper, when the supplies from the interior would be coming to hand.

In the *Russian* markets the operations in grain have been confined to the local necessities; and, as the port of St Petersburg has been closed to free importations, the only interest in the markets has been confined to *linseed*. At St Petersburg extensive purchases have been made for spring shipment, and prices have been subjected during the season to considerable fluctuation;

Morschansky seed, which had been selling at 41/4 to 44/ rose to 48/4 on receipt of the advices intimating the unfavourable result of the whale-fishery in Davis Straits. On the closing of the ports by ice, the contract prices remained high, and the best qualities have been selling at 43/ to 43/9 for August delivery. At Riga prices of wheat have sustained little variation, Courland wheat being noted at 22/8 to 26/3; linseed had advanced from 1/8 to 2/2 per qr., the currencies ranging from 39/1 to 43/3.

In the *Prussian* grain-trade considerable animation has been created by the improvement in the British markets, large orders having been received from the United Kingdom for the fine qualities of high-mixed Danzig and Königsberg wheats. At the former city, though fine high-mixed qualities during December and the beginning of January were offering as low as 26/ to 26/6 per qr., yet speculators could not be induced to make any investment on the article, though such a depressed currency seemed almost certain of eventually paying. As our markets became dearer, the foreign trade fully participated in the improvement, and Danzig as well as Königsberg samples advanced to 32/ and 33/, fine wheat being noted at 34/ to 35/. The crops are backward, owing to the lateness of the winter, but no complaints have been yet made as to the appearances of the growing grain. Rapeseed was increasing much in cultivation. At Stettin the short stocks of the finer wheats have kept the currencies relatively higher than at other Baltic ports; the enhancement, therefore, in the currencies of other markets has not effected the quotations in the same degree, prices not being more than 1/ to 1/6 per qr. higher, best Marks qualities being noted at 26/6 per qr.

In *Mecklenburg* a stimulus has been communicated to the markets, from the causes previously alluded to, and wheats at Stralsund, Bostock and Wismar have advanced about 3/6 to 4/, shipping rates being rated at 26/ to 26/ Sterling, as in quality, the fine samples being difficult to obtain, unless in small parcels, as they arrive from the interior. The quality of the wheats are good, and weighing 61 lb to 62 lb. Barley was short in stock, and worth 14/6 to 16/6, and several cargoes had been dispatched to Norway and Sweden. When the rates of wheat were ruling at 20/8 to 22/, some shipments were made to the United States of America, and even at higher prices a few parcels have been sent to the same destination. Rapeseed has been cleared off at about £ 32 per last, oats have been bought at 13/6 Sterling per qr.

In *Holstein* the wheat trade has been firm, and at Kiel and Lubeck the better qualities are not to be obtained under 24/6, and fine 25/ Sterling per qr. Barley has been held at 16/ to 16/, but is now rather lower. The crops of wheat were inferior in quality and colour to the superior sample produced in 1834, though better than in previous seasons. The old stock of barley having been cleared off on Norwegian and Swedish account, and much of the new growth having gone to the same countries, besides shipments to Jutland and Schleswick, where the late growth did not prove equal to the consumption, the stocks on hand have become very moderate, and prices, therefore, have ranged comparatively higher than wheat. Rapeseed in November advanced to its highest point, which was £ 34 ¹/₂ last, since which it has receded, and has been nearly all bought up at £ 31, 10/ to £ 32.

At *Hambury* similar causes have operated in enhancing the prices of wheat

which have advanced from 22/ and 23/ per qr. for Marks; Magdeburg, Saale, and Anhalt red wheats to 26/ and 27/, and are now steady at 25/ to 26/ Sterling. Large purchases have been made on English account, as well as for shipment to the United States. Barley has been also bought for the same part of the world, and also for shipment to Portugal. Beans have been much in demand for England, at 20/ to 22/6, and white pease at 22/ to 25/. The breadth of wheat sown this year in most of the districts contiguous to the Elbe has been much diminished, and the ground occupied with beet root, with the view of making sugar; and farmers have been induced to adopt this alteration, partly from the low and unremunerating price which wheat has borne, but chiefly owing to offers by the party who has purchased a patent for the extraction of a larger quantity of saccharine matter from a given quantity of beetroot than has been yet effected, and who has engaged to take any quantity of beetroot the farmers will grow, at a stipulated price.

QUARTERLY AGRICULTURAL REPORT.

JUNE 1836.

If the winter quarter was remarkable for variety, the spring one has been no less so for uniformity of cold and chilly weather, arising, in great measure, no doubt, from the continued influence on the air of the great quantity of snow which had fallen among the mountains, a quantity only exceeded by the fall of 1823. The chilling air has, in consequence, much retarded vegetation. Indeed, it has been asserted, that field operations have not been so backward in any spring since 1817; but there is no need of taking so distant a retrospective view as 1817 for a late spring, for in 1823 the snow had to be ploughed around the margin of fields in the middle of April, to permit the ploughing of lea. The heavy fall of snow in the mountains has caused the destruction of many thousands of sheep. It is stated that one-fifth of lambs and one-fourth of ewes and hoggs of some large flocks have perished. Such a fearful statement excites the most serious apprehensions of the propriety of the present winter management of mountain flocks. Some years ago it was a customary practice in winter to bring sheep from the mountains to rough pastures in the lowlands. The practice imposed much travel on the sheep, and, owing to the mild winters for years past, it has been relinquished. But when the objectionable practice was abandoned, provision should have been made for the safety of the flock in the recurrence of severe winters. Now, the use of bone-dust in raising turnips presents, we conceive, a ready help in time of need. There is not a store farm which presents not a favourable spot whereon turnips might be easily raised; and were a two-course rotation of turnip and a white crop to be regularly practised on such a farm, a large breadth of turnips might be obtained every year on a limited extent of ground. Such a rotation of cropping would be quite legitimate on the arable portion of a store farm, for there the white crop would never require to be sown down with grass, the natural grasses amply supplying all the requisite hay. A ring fence of whin would protect the turnip, corn, and hay

from depredation by cattle and sheep.—On the 9th May the sky cleared up, and the sun shone with power and splendour. His heat quickly melted the cerements of the leaf buds, and liberated into open day myriads of leaves to clothe the trees with every hue of delicate vernal green: realizing the descriptions given of the sudden but enchanting transition from winter to summer in Lapland. Ever since, to the last day of the month, the sun has run his daily course in a cloudless sky, and favoured us with one of the most beautiful Mays ever enjoyed by husbandmen. The annular eclipse of the sun, on the 15th, was therefore “very visible to be seen,” as we heard a shepherd express himself. The effects of the said eclipse, we confess, disappointed us. Philosophers foretold us that the sky would be so dark as to induce the cocks and hens to go to roost, and the birds to their nests, as if fledged birds ever sleep in their nests. Now, we saw the swallows and rooks soaring it aloft, and contemplating as little going to bed, as any biped on earth.

Rain was much wanted, particularly for the gardens, but as long as the decided cold easterly winds continued there was no rain, and but little dew, nor did any mist spread itself over the country from the sea. June brought rain, and for four days mildness and moisture promoted vegetation. Since the 5th, the wind has veered to the north, accompanied with chilling cold, storminess, and the aurora borealis, not unlike June of last year. Without or with rain the hay crop must be short, the young grass being very backward, and although the grass was thickly planted in the winter, it now looks thin, and where obliged to be eaten, already appears as if burnt up with severe drought. This scorched appearance, after being eaten, has probably been superinduced by dry frosty air at night, and hot sunshine through the day. The prospect of summer pasture is thus very discouraging. Good grass parks in favoured situations have, in consequence, let at exorbitantly high prices—as much as L.24 per Scotch acre. Young wheat looks pretty well upon kindly soils, but on clay lands which have become hard and crusty it looks sickly, and is thin on the ground for want of tillering. Under any circumstances, we conceive, that wheat must now be deficient on clay lands. It is supposed that about one-fifth less is sown this season. It must, however, be held in remembrance that wheat has always a *sickly* appearance at this season, and that a short crop of good quality is better than a bulky one of inferior. Oats generally have received a favourable bed, but, as yet, do not bear a flattering aspect. Barley is now all sown. On wet lands the sowing has been much delayed. Its braird promises much. Neither pease nor beans got a favourable bed, and, in consequence, are thin, and, in some places, even shy to look out of the ground.

The demand for all kinds of fat stock still increases, and prices, as will be seen by the tables of butcher meat, have continued to advance since the date of last report. The exportation of live-stock and dead meat from Scotland to London, by steam, now constitutes a great trade. From Inverness, Aberdeen, Montrose, Dundee, Edinburgh, Leith, and Berwick-on-Tweed, steamers of large class, ply, or are about to ply, to London with animal produce. In all probability, wool will again realize good prices, and, if the great sacrifice of sheep in the hills is taken into consideration, we should anticipate extraordinary prices this season. At present there are strange fluctuations in the wool-market, occasioned, no doubt, by speculators; but farmers should know

their own interest better than to be deceived with such flimsy devices to entrap them to dispose of their wool at lower prices than they have received in the last two years.

The Committee appointed by the House of Commons to inquire into the state of Agriculture, has already published two large volumes of evidence. What recommendations its report will contain, we cannot anticipate from the evidence. But we confess we have misgivings of any benefit which agriculture will derive from the labours of *this* committee, constituted, as it evidently was, with particular materials. In the time and manner of forming the committee, Ministers, very unhandsomely, in our opinion, gave the Marquis of Chandos the go-by. The Marquis was entitled to form the committee, which he early requested to inquire into the alleged distress of farmers, if granted at all, as he chose; his high character being at all times a sufficient guarantee to the country, that any committee formed by him would act fairly and honourably.

Among the expedients afloat for the relief of agriculturists, we observe the proffered assistance of a company to advance money to farmers on deposits of grain, the cash advanced being of course much below the value of the deposit. This must be a species of pawning; and the lenders of money in this case, must have for their object the acquisition of large profits, like pawn-brokers in every other case. To raise money by pawn may suit the desperate circumstances of despairing men, but surely the condition of farmers is not yet so desperate as to drive them into so ignoble a barter. Will the exchange of valuable grain for less valuable cash, amend the condition of the farmer? Will the grain deposited in another man's store at half its value, support the credit of the farmer in a higher degree than the same grain left on his own premises at its full value? Besides, how is the deposited grain to be afterwards identified on redemption? In truth, the scheme is so delusive in all its aspects, that we sincerely hope our agricultural friends will shun it as they should always shun the disreputable practice of pawning, although it should be presented to them in the most alluring form. A small cash-account, secured through the credit of a friend or friends, at a liberal bank established on the principles and conducted with the prudence of the Scottish Banking Companies, will relieve temporary embarrassments and afford a lasting source of replenishment.

A company for refining sugar from sugar-beet, holds out flattering allurements to farmers to grow the sugar-beet. There is no question that, were a steady market open for it, the cultivation of the sugar-beet would repay the farmer better than some of the crops which occupy his attention at present; but he would require, in the first instance, to be satisfied that such a market would likely become permanent, ere he would be induced to change the crops usually cultivated in rotation. Before such a company can survive, it must be able to present sugar of the same quality, and at not a higher price, than that obtained from our sugar colonies. The anticipation, that a company could supply beet-sugar on such terms certainly augurs very unfavourably of the productive powers of the West India islands, after the expiry of the apprenticeship system in 1840.

Railroads are every where pressed upon the landed interest as profitable

speculations. Whether they shall be profitable speculations, depends on many circumstances with which the landed interest have no concern. That railroads in *all* circumstances must be beneficial to agriculture, admits of question. The present mania for their universal construction very much resembles the mania for mining gold and silver in America in 1825, only that the capital required for railroads must be spent within the country, and not thrown away among outlandish savages. This is a redeeming quality in the present mania for railroads.

After much opposition, Islington market for the sale of live-stock has been opened to the public. Breeders of live-stock are infinitely obliged to the public spirit and fortitude of its owner, Mr Perkins, for having so patriotically risked a large capital in a doubtful struggle. He has now, in a great measure, gained his point in the establishment of a market, and the number of stock is increasing in it daily; and although much opposition, arising from resentment, prejudice, and a sense of defeat, will yet have to be overcome, before Islington market shall present the interesting spectacle which it is capable of presenting,—yet it is in the power of the owners of stock themselves to overcome these obstacles by *simply studying their own interest*. It is without question, the interest of those who send live-stock to the London market, to have them well-cared for before, at, and after the period of sale,—cared for not only by ease and comfort in accommodation, but by refreshments continually at command. Compare these circumstances as they exist in Smithfield with Islington. In the latter is every thing to render the situation comfortable to man and beast; in the former, every thing to render man and beast miserable. It is in the power of every owner of stock who desires to send them to the London market, to bestow those comforts on them, by simply directing his salesman to dispose of his stock at Islington market, and at Islington market only, on pain of dismissal, and such a command will insure punctual obedience.

We recommend to the attention of literary agriculturists a pamphlet entitled, “The Future Prospects of the British People,” by the author of that important statistical work, “The State of the Nation,” in which many erroneous and vague opinions afloat at present on the condition of the farmer, are put right by reference to undoubted and recorded facts. Mr Blacker’s book on “The Claims of the Landed Interest to Legislative Protection,” also deserves careful perusal by the landed proprietor and farmer. There is more sound political economy to be found in its few pages than in many volumes of delusive sophisms, with the high-sounding titles of principles of political economy, which have of late years been written more in support of certain preconceived theories, than the investigation of truth.

In Old Bell’s Weekly Messenger of the 23d May, we observed the following paragraph: “In East Sussex some of the principal farmers on the 18th joined in a half-crown annual subscription for purchasing ‘*The Quarterly Journal of Agriculture, and Prize Essays and Transactions of the Highland and Agricultural Society of Scotland*,’ to be deposited at a circulating library in the town of Lewes, to be then delivered on the market days to the subscribers in the order of their subscriptions; and to the names of these farmers are added those of large landed proprietors and clergy, in hopes this inquiry into the plans which have caused agriculture *not* to flourish in North Britain, that the

bleak north supplies a large proportion of the fatted meat now sold in London; and that agriculture in South Britain may rise from the depressed state which has made it petition for legislative relief." We trust the farmers of other counties in England will follow the good example thus set them by those of Sussex. In the preceding volumes of this Journal will be found practical essays illustrative of almost every subject of farm management, and figures of every improved implement of husbandry used in this country. In the Transactions are accounts of many improvements made by proprietors and farmers throughout the country, with the costs particularised. We do not assert that every practice in the husbandry of Scotland is applicable to the soil and climate of England; but it is evident that that practice which is safe in the poor soil and bad climate of Scotland, may confidently be pursued in the good land and much finer climate of England. Let the experiment of Scotch farming be *fairly* tried in England, in any of the southern or midland counties, and success will assuredly be the result. The ruling principles of Scotch farming are economy and skill,—skill in adapting the culture to the soil and situation, and economy in arriving at its completion with the least labour. What more is requisite "to make the wilderness to blossom as the rose?" The will.—Book-farming, we know, is not in favour with farmers, otherwise we should find admittance into *every* farmer's library, and every farmer has a library. But although we know, and therefore admit, that no man can be made a farmer by book, we cannot admit that the best farmer may not at a time find useful hints in a book. The best farmer cannot know every article of practice which is followed in every part of the country, and as most practices are discovered by what is called chance or accident, it is clear that the discovery cannot generally be made known until it is disseminated abroad. A farmer who travels appreciates the information which he receives in conversations with farmers, and by observation of field-labour. Such a farmer possesses advantages over him who always remains at home, that is, within the circle of his markets. Now the object of an agricultural book, and particularly of an agricultural periodical work, is, at stated times, to carry hints, suggestions, and discoveries, important or unimportant, to the home of the farmer, that he who loves to stay at home may possess the advantages of him who travels at times abroad, and that he who travels abroad may compare what he has seen with what he reads, and decide which practice is the best suited to his particular purpose; or perhaps when comparing the hints of others, he may himself discover a practice superior to them all. In this manner a good agricultural periodical work is the means of disseminating through the country practices which would be confined to the district which gave them birth. Its principal aim should be to be a *good* work, that is replete with suggestions of good sense, and with confirmations of experience. The collection and presentation of these desiderata is attended with much trouble and expense, and unless the labour is appreciated and encouraged, —and hitherto it has not been appreciated and encouraged as it ought,—it is impossible to use means to collect the most valuable kind of information for presentation.

TABLES OF PRICES, &c.

range Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets:—

LONDON.							DUBLIN.					
Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.		Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Bar. 9 St.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.		1836.	s. d.	s. d.	s. d.	s. d.	s. d.
12 0	30 8	21 4	27 2	34 2	34 1		Feb. 5.	24 6	14 9	12 0	10 6	14 6
11 11	29 9	21 1	27 6	33 8	33 19		12.	25 0	15 0	12 0	11 0	15 6
12 11	29 11	21 9	27 0	33 9	33 2		19.	25 6	14 0	11 9	11 3	15 8
14 0	30 2	23 1	27 8	33 6	33 8		26.	26 6	14 6	11 10	11 6	15 9
17 0	30 9	23 2	28 0	34 2	33 5		Mar. 4.	27 0	15 10	12 0	12 0	16 0
18 9	30 3	22 10	27 6	34 10	34 7		11.	27 6	15 3	12 6	12 3	16 6
16 9	31 5	23 2	28 6	35 0	33 9		18.	27 9	16 0	13 6	12 6	17 0
16 3	32 8	23 9	29 0	34 6	33 9		25.	28 6	16 0	13 6	12 0	17 3
18 5	30 9	23 0	29 2	34 10	34 0		31.	29 0	16 3	13 9	12 6	16 10
10 7	32 6	23 1	30 4	35 6	32 6		April 2.	30 0	16 4	14 0	12 3	16 0
1 5	33 0	23 0	30 8	36 6	33 0		15.	30 4	16 0	13 9	12 6	16 0
2 0	34 1	23 5	31 6	38 0	36 0		22.	31 0	16 2	14 0	13 2	16 6
0 9	33 2	23 1	31 0	36 0	35 6		29.	31 6	16 3	14 2	13 6	16 6
LIVERPOOL.							EDINBURGH.					
Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.		Date.	Wheat.	Barley.	Oats.	Pease.	Beans.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.		1836.	s. d.	s. d.	s. d.	s. d.	s. d.
10 3	31 4	19 8	27 8	34 6	39 1		Feb. 3.	38 4	29 0	21 9	31 0	31 10
11 4	27 10	19 10	27 6	35 8	38 0		10.	38 6	26 8	20 10	30 6	31 0
1 9	27 3	20 4	28 0	35 4	33 5		17.	39 1	27 9	22 1	30 10	31 2
13 5	31 9	21 1	27 4	34 6	37 9		24.	41 6	28 3	23 2	31 6	32 0
3 4	27 8	22 6	29 2	34 2	33 4		Mar. 2.	40 0	27 1	23 0	32 0	32 6
4 9	33 9	21 6	30 6	35 4	38 9		9.	42 2	29 10	23 2	32 0	32 6
2 3	27 6	22 1	31 8	35 10	37 9		16.	42 3	31 2	23 6	32 0	32 6
4 3	27 0	21 1	32 0	36 6	37 10		23.	43 10	1 0	23 4	32 0	32 3
5 10	32 4	21 5	30 0	35 9	35 0		31.	45 6	33 8	24 0	31 8	32 2
6 8	29 4	20 9	28 8	37 4	37 2		April 6.	47 3	36 2	24 6	31 4	32 0
6 10	34 0	20 10	30 2	38 0	38 4		13.	48 8	36 5	25 4	32 4	33 6
5 4	30 0	21 8	29 8	37 6	38 11		20.	46 1	34 3	25 2	34 0	33 2
5 10	28 4	22 1	30 6	36 8	37 11		27.	48 7	34 7	24 10	34 6	35 3

E shewing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN IN; the Duties payable thereon, from February to May 1836.

Wheat.		Barley.		Oats.		Rye.		Pease.		Beans.	
Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Weekly Average.	Aggregate Average.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
37 8	49 8	8 29	2 38	1 19	19 10	8 19	0 18	3 27	10 3	3 33	4 34
38 4	48 8	8 29	0 23	4 10	10 10	8 19	2 18	3 27	6 11	3 33	4 34
39 0	47 8	8 28	1 28	7 10	10 10	8 19	3 18	3 27	4 27	3 33	4 34
39 11	47 8	8 29	0 23	10 10	10 10	8 19	3 18	3 20	0 27	4 28	9 34
44 0	48 8	8 29	4 29	0 12	4 21	8 22	3 16	9 31	2 38	0 27	1 33
42 0	44 8	8 29	4 29	2 18	4 21	8 22	7 16	9 32	5 29	0 25	9 33
42 9	44 8	8 29	8 29	3 18	4 21	8 22	10 16	9 28	0 29	4 25	9 33
43 7	43 8	8 30	5 29	3 18	4 21	8 22	1 15	3 30	8 29	7 25	9 34
44 7	42 8	8 30	9 29	9 18	4 21	9 21	4 15	3 29	4 29	11 25	9 35
46 5	41 8	8 31	4 30	2 16	10 21	9 21	6 15	3 30	2 30	3 24	3 36
46 1	40 8	8 32	1 30	7 16	10 22	1 21	7 15	3 29	7 30	0 24	3 38
46 9	40 8	8 32	11 31	15 4	4 22	3 21	9 15	3 32	4 30	0 24	3 36
47 5	39 8	8 32	8 31	15 4	4 22	2 21	11 15	3 31	2 30	0 24	3 40

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof: from 5th Nov. 1835 to 5th Jan. 1836.

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
Feb. 5. 1836.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . . .	1 2	..	1 2	1 3	576 3	877 6	846,340 5	46,235 6	892,575 1
Barley, . . .	..	..	..	..	..	..	49,815 5	25 1	49,840 6
Oats, . . .	..	..	..	..	..	..	239,329 2	690 0	239,329 2
Rye, . . .	..	..	..	..	..	..	3,449 3	..	3,449 3
Pease, . . .	272 0	..	272 0	56 2	..	56 2	7,811 1	..	7,811 1
Beans, . . .	1,090 0	..	1,090 0	2 2	..	2 2	3,388 7	..	3,388 7
Totals, . . .	1,363 2	..	1,363 2	59 7	576 3	636 2	843,225 7	46,940 7	890,166 4
March 5.									
Wheat, . . .	0 2	0 5	0 7	0 5	1,276 3	1,277 0	533,448 2	45,767 4	579,215 6
Barley, . . .	..	..	..	..	..	..	47,191 7	25 1	47,216 8
Oats, . . .	..	..	..	24 7	..	24 7	228,048 3	695 0	228,048 3
Rye, . . .	..	..	..	..	..	..	1,484 3	..	1,484 3
Pease, . . .	43 0	1 4	44 4	2 6	1 4	4 2	7,884 6	..	7,884 6
Beans, . . .	408 4	..	408 4	2 7	..	2 7	3,694 4	..	3,694 4
Totals, . . .	451 6	2 1	453 7	30 1	1,277 7	1,309 0	891,982 1	46,488 5	938,470 6
April 5.									
Wheat, . . .	..	..	..	..	500 0	500 0	506,250 2	45,327 4	551,577 6
Barley, . . .	..	..	..	29 1	..	29 1	41,343 1	25 1	41,368 2
Oats, . . .	..	..	..	56 7	..	56 7	219,971 2	695 0	219,971 2
Rye, . . .	..	..	..	..	..	..	1,484 3	..	1,484 3
Pease, . . .	797 3	0 2	797 5	96 4	0 2	96 6	8,384 5	..	8,384 5
Beans, . . .	861 0	..	861 0	..	..	..	4,735 4	..	4,735 4
Totals, . . .	1,638 3	0 2	1,638 5	182 4	500 2	682 6	782,198 1	46,038 5	828,236 6
March 5.									
Flour, . . .	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Oatmeal, . . .	3,204 0 17	..	3,204 0 17	6 0 8	3,083 1 1	3,083 1 1	197,506 0 7	15,556 0 27	213,062 0 4
Totals, . . .	3,205 0 5	..	3,205 0 5	6 3 24	3,083 1 1	3,089 0 25	198,041 1 18	15,556 0 27	213,597 1 45
Feb. 5.									
Flour, . . .	4,020 0 26	37 3 11	4,058 0 9	12 3 11	1,522 0 11	1,534 3 22	217,631 2 24	20,053 0 10	237,684 2 34
Oatmeal, . . .	..	..	..	..	..	..	75 1 8	..	75 1 8
Totals, . . .	4,020 0 26	37 3 11	4,058 0 9	12 3 11	1,522 0 11	1,534 3 22	217,707 0	20,053 0 10	237,760 0 10
April 5.									
Flour, . . .	5,637 2 13	..	5,637 2 13	1 3 0	1,837 3 21	1,839 0 21	186,744 2 4	13,780 2 5	200,524 4 9
Oatmeal, . . .	4 1 13	..	4 1 13	..	..	..	78 0 20	..	78 0 20
Totals, . . .	5,641 3 26	..	5,641 3 26	1 3 0	1,837 3 21	1,839 0 21	186,822 2 24	13,780 2 5	200,602 4 29

PRICES of BUTCHER-MEAT.

Date.	SMITHFIELD, Per Stone of 14 lb.		MORPETH, Per Stone of 14 lb.		EDINBURGH, Per Stone of 14 lb.		GLASGOW, Per Stone of 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1836.								
Feb.	7/ @ 8/9	7/3 @ 8/9	7/3 @ 8/	7/6 @ 8/6	6/ @ 6/9	6/3 @ 7/	6/3 @ 7/	6/6 @ 7/3
Mar.	7/ @ 8/3	7/6 @ 9/3	7/6 @ 8/3	7/6 @ 9/	6/3 @ 7/	6/6 @ 7/6	6/3 @ 7/3	6/6 @ 7/6
April.	7/6 @ 8/6	8/6 @ 10/	7/9 @ 8/3	7/9 @ 9/6	6/6 @ 7/6	6/6 @ 7/9	6/6 @ 7/6	6/9 @ 7/9

PRICES of English and Scotch WOOL.

ENGLISH, per 14 lb.—*Marino*, Washed, 26/ @ 30/; in Grease, 21/ @ 26/—*South Down*, 24/ @ 26/; *Leicester*, Hogg, 24/ @ 25/; Ewe and Hogg, 22/ @ 23/;—*Lochs*, 14/ @ 16/; *Moor*, 10/ @ 13/;—*Oron*, per 14 lb.—*Leicester*, Hogg, 41/ @ 44/; Ewe and Wether, 35/ @ 40/;—Ewe, 31/ @ 34/;—*Cheriot*, 18/ @ 21/; Washed, 14/ @ 18/; Laid, 8/ @ 9/; *Moor*, White, 8/ @ 9/; Laid, 7/ @ 7/4.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of April 1835, and 5th of April 1836,—showing the Increase and Decrease on each head thereof.

	Quarters ended April 5.		Increase.	Decrease.	Years ended April 5.		Increase.	Decrease.
	1835.	1836.			1835.	1836.		
	£	£	£	£	£	£	£	£
Customs, ..	4,286,877	4,449,838	162,961	..	17,680,305	18,785,867	1,105,562	..
Excise, ..	1,687,574	1,863,312	175,738	..	12,150,068	11,790,408	..	459,570
Stamps, ..	1,654,387	1,697,884	43,497	..	6,565,171	6,619,806	47,635	..
Post-Office, ..	356,000	368,000	7,000	..	1,386,800	1,425,000	39,000	..
Taxes, ..	245,354	180,054	..	56,300	4,313,627	3,620,223	..	693,404
Miscellaneous, ..	10,968	16,743	5,755	..	56,622	65,621	8,999	..
	8,944,190	8,563,941	384,951	56,300	42,090,783	42,330,015	1,261,195	1,121,974
Deduct Decrease, ..	..	..	56,300	..	..	..	..	..
Increase on the quarter, ..	..	..	330,651	..	Increase on the year, ..	..	139,222	..

FIAR PRICES of the different COUNTIES of SCOTLAND, for Crop and Year 1835, by the Imperial Measure.

ABERDEENSHIRE.

	Imp. Qr.
Wheat, without fodder, ..	34/9
— with fodder, ..	35/
Barley, without fodder, ..	23/7½
— with fodder, ..	28/7½
Beas, without fodder, ..	21/8½
— with fodder, ..	26/8½
Oats, Best, without fodder, ..	19/3
— with fodder, ..	24/6
— Second, without fodder, ..	18/
— with fodder, ..	24/3
Pease, ..	25/6
Beans, ..	25/6
Malt, duty included, ..	45/
Oatmeal, per Boll, 140 lb., ..	13/6

ARGYLE.

Beas, ..	25/4
Oats, ..	19/
Beans, ..	30/
Oatmeal, per Boll, 140 lb., ..	16/7

AYR.

Wheat, ..	36/2½
Barley, ..	26/4
Beas, ..	23/6½
Oats, ..	17/7½
Pease and Beans, ..	33/1
Oatmeal, per Boll, 140 lb., ..	15/11

BANFF.

Wheat, ..	30/6
Barley, without fodder, ..	23/6
— with fodder, ..	28/6
Beas, First, without fodder, ..	22/
— with fodder, ..	27/
— Second, without fodder, ..	20/6
— with fodder, ..	25/6
Oats, Potato, without fodder, ..	19/
— with fodder, ..	25/
— Common, without fod., ..	17/
— with fodder, ..	23/
Pease, ..	24/
Beans, ..	25/
Oatmeal per Boll, 140 lb., ..	12/3

BERWICKSHIRE.

	Imp. Qr.
Wheat, ..	34/10½
Barley, Merse, ..	23/10½
— Lammermuir, ..	21/7
Oats, Merse, ..	20/7½
— Lammermuir, ..	18/6
Pease, ..	27/7½
Oatmeal, per Boll, 140 lb., ..	15/4

BUTE.

Wheat, ..	37/5½
Barley, ..	25/0½
Beas, ..	23/0½
Oats, ..	20/
Pease, ..	36/
Beans, ..	33/1½
Oatmeal, per 140 lb., ..	16/

CAITHNESS.

Beas, ..	21/
Oats, Potato, ..	30/
— Early Angus, ..	18/
Oatmeal, per 140 lb., ..	15/3

CLACKMANNAN.

Wheat, ..	35/3½
Barley, Kerse, ..	25/0½
— Dryfield, ..	24/6
Oats, Kerse, ..	19/7½
— Dryfield, ..	19/9½
Pease and Beans, ..	29/1
Malt, ..	50/
Oatmeal, per Boll, 140 lb., ..	16/4

DUMBARTON.

Wheat, ..	36/3
Barley, ..	27/
Beas, ..	23/11
Oats, ..	30/9
Pease and Beans, ..	33/
Oatmeal, per 140 lb., ..	16/2

DUMFRIESSHIRE.

	Imp. Qr.
Wheat, ..	38/
Barley, ..	34/3
Oats, Potato, ..	19/3
— White, ..	17/
Beans, ..	31/6
Rye, ..	28/6
Beas, ..	24/
Oatmeal, per 140 lb., ..	14/7

EDINBURGH.

Wheat, First, ..	33/6
— Second, ..	32/
Barley, First, ..	27/5
— Second, ..	25/6
— Third, ..	23/
Oats, First, ..	20/
— Second, ..	18/
Pease and Beans, ..	27/8
Oatmeal, per Boll, 140 lb., ..	15/6

FIFE.

Wheat, White, ..	29/6½
— Red, ..	27/6½
Barley, ..	25/4½
Beas, ..	21/
Oats, ..	18/8½
Pease and Beans, ..	25/8½
Rye, ..	22/6½
Malt, ..	..
Oatmeal, 140 lb., ..	15/10½
— by measure, ..	14/10½

FORFAR.

Wheat, ..	36/4
Barley, ..	33/11
Beas, ..	19/9
Oats, Potato, ..	30/9
— Common, ..	22/
Pease and Beans, ..	..
Rye, ..	..
Oatmeal, per Boll, 140 lb., ..	1

HADDINGTONSHIRE.

	Imp. Gr.
Wheat, First,	30 3
— Second,	28 7
— Third,	32 0 1
Barley, First,	31 6
— Second,	29 2 1
— Third,	26 5 1
Oats, First,	22 7 1
— Second,	21 0 1
— Third,	19 6 1
Pease and Beans, First,	31 0 1
— Second,	29 1 1
— Third,	27 8 1

INVERNESS.

Wheat, without fodder,	34 6
— with fodder,	40 6
Barley, without fodder,	27 1
— with fodder,	32 1
Bear, without fodder,	22 6
— with fodder,	27 6
Oats, Potato, without fodder,	22 8
— with fodder,	28 1
Oats, Common, without fod.	21 6
— with fodder,	26 1
— Black, without fodder,	19 6
— with fodder,	13 1
Pease, without fodder,	29 6
— with fodder,	35 6
Beans, without fodder,	29 6
— with fodder,	34 6
Rye, without fodder,	29 6
— with fodder,	34 6
Oatmeal, per Boll, 140 lb,	19 1 1
— Black Oats, 140 lb,	21 6
— 9 stone Dutch,	19 1
— Black, do.,	19 1

KINCARDINE.

Wheat, without fodder,	36 8
— with fodder,	44 8
Barley, without fodder,	22 6
— with fodder,	28 1
Bear, without fodder,	19 1
— with fodder,	24 6
Oats, Potato, without fodder,	18 8
— with fodder,	26 8
— Common, without fod.	18 1
— with fodder,	25 1
Pease, without fodder,	25 4
— with fodder,	32 10
Beans, without fodder,	26 5
— with fodder,	34 5
Oatmeal, per 140 lb,	15 3 1

KIRKCUDBRIGHT.

Wheat,	38 10
Barley,	24 2
Oats, Potato,	18 1
— Common,	17 2
Oatmeal, per Boll, 140 lb,	13 6 1

KINROSS.

Wheat,	32 1
Barley, First,	23 1
— Second,	19 1
Bear, First,	18 1
— Second,	15 1
Oats, White, First,	19 9
— Second,	17 9
— Black, First,	16 1
— Second,	14 1
Pease and Beans,	26 1
Oatmeal, per 140 lb,	15 6

LANARKSHIRE.

	Imp. Gr.
Wheat, First,	37 7 1
— Second,	34 10 1
Barley, First,	34 7 1
— Second,	22 9 1
Bear, First,	24 3 1
Bear, Second,	21 4 1
Oats, First,	20 1 1
— Second,	18 2 1
Pease,	30 10 1
Beans, First,	33 4
Malt,	50 1
Oatmeal, per Boll, 140 lb,	15 9 1
— Second,	15 7 1

ARCHBISHOPRIC OF
GLASGOW.

Barley,	25 9
Oats,	22 1
Oatmeal, per 140 lb,	18 1 1

LINLITHGOW.

Wheat,	35 3
Barley,	26 5
Oats,	20 1 1
Pease,	30 8
Malt,	47 1
Oatmeal, per 140 lb,	15 8 1

MORAY AND ELGIN.

Wheat,	34 6
Barley,	24 1
Oats,	19 3 1
Rye,	29 1
Pease and Beans,	31 1
Oatmeal, per 140 lb,	16 10 1

NAIRN.

Wheat,	35 1
Barley, without fodder,	27 1
— with fodder,	32 1
Oats, without fodder,	20 1
— with fodder,	32 1
Oatmeal, per 140 lb,	17 6

PEEBLES.

Wheat, First,	36 7 1
— Second,	34 0 1
— Third,	30 6 1
Barley, First,	26 6 1
— Second,	24 2
— Third,	22 5 1
Oats, First,	20 5 1
— Second,	18 2 1
— Third,	15 10
Pease, First,	29 2
— Second,	27 2 1
— Third,	25 9 1
Oatmeal, First, per Boll, 140 lb,	16 3
— Second,	15 3
— Third,	14 6

PERTH.

Wheat, First,	38 7
— Second,	30 1
Barley, First,	23 1
— Second,	22 2
Oats First,	20 10
— Second,	18 1 1
Pease and Beans,	26 8
Oatmeal, per Boll, 140 lb,	16 1

RENFREWSHIRE.

	Imp. Gr.
Wheat, First,	37 1
— Second,	36 4
Barley, First,	28 3
— Second,	26 1 1
Bear,	23 4
Oats, First,	20 1 1
— Second,	19 2
Pease and Beans,	34 1
Oatmeal, per Boll, of 140 lb,	16 3 1
— Second,	14 4 1

ROXBURGH.

Wheat,	35 8
Barley,	24 10
Oats,	20 5
Pease,	27 9
Beans,	29 3
Oatmeal, 140 lb,	15 6 1

ROSS AND CROMARTY.

Wheat, First,	32 6
— Second,	31 1
Barley,	29 2 1
Bear,	26 1
Oats, Potato,	21 7
— Common,	19 9 1
Pease,	24 1
Oatmeal, per Boll, 140 lb,	19 7

SELKIRK.

Wheat,	35 3
Barley,	24 6
Oats, Potato,	20 3
— Common,	17 10
Pease,	29 2
Oatmeal, per 140 lb,	14 1

STIRLING.

Wheat,	35 1
Barley, Kers,	26 6
— Dryfield,	24 1
Oats, Kers,	26 6
— Dryfield,	22 1
— Muirland,	17 4
Pease and Beans,	29 1
Malt,	49 4
Oatmeal, per Boll, 140 lb,	14 6

SUTHERLAND.

Wheat,	36 6
Barley,	26 1
Bear,	22 1
Oats, Potato,	21 1
— Common,	19 1
Pease,	26 1
Oatmeal, 140 lb,	14 1

WIGTON.

Wheat,	35 7
Barley,	24 1
Bear,	22 1
Oats, Potato,	19 6
— Common,	18 10
Pease,	27 1
Beans,	24 4
Rye,	22 3
Malt,	49 1
Oatmeal, 140 lb,	14 2

We may inform our English Readers, that the Fiar Prices are the average prices of grain as ascertained every year by the verdicts of Juries in every county of Scotland. These Juries are summoned in Spring, and ascertain from the evidence produced to them the average prices of the preceding crop. By these prices, rents payable in grain, and similar contracts, are generally determined; but the main object is to convert into money the amount due for the most part payable in grain, of the Scottish Clergy.

THE
QUARTERLY
JOURNAL OF AGRICULTURE.

BIOGRAPHICAL MEMOIR OF THE LATE RIGHT HONOURABLE
SIR JOHN SINCLAIR, BART., FOUNDER AND FIRST PRESIDENT
OF THE BOARD OF AGRICULTURE, &c. &c. &c.

(Continued from No. 33, p. 38.)

BEFORE proceeding to give an account of Sir John Sinclair's next great undertaking,—the Code of Health and Longevity,—it is necessary to make at least a passing allusion to some of his other labours for the benefit of mankind, towards the close of the last century, or commencement of the present. In an essay like the present, we cannot overlook his exertions to bring into public use the great discoveries in the art of draining land, made by Mr Joseph Elkington, a Warwickshire farmer. Yet, although this system originated with that singular person, he was, in a great measure, unable to give to the world any very connected or distinct account of it; and, to obviate the difficulties arising from that circumstance, Sir John recommended Mr John Johnstone, an intelligent land-surveyor, to the attention of the Board of Agriculture, as a gentleman amply qualified, not only to take plans of his different operations, but to give explanations of them.

Mr Johnstone was accordingly nominated by the Board, to accompany Mr Elkington on a survey of the different drainages he had accomplished in several of the English counties, in order that a proper report might be drawn up of the principles on which his operations were founded, as well as practical details of the mode in which these were executed. The result was the publication of a systematic treatise on the theory and practice

of draining land, which has become of standard influence on the subject of which it treats, and of which three editions have appeared,—the first in 1797, the second in 1801, and the third last year, revised and enriched with so many valuable additions as almost to render it a new work.* In this way a complete account of Elkington's system was communicated to the public, and thousands enabled to put it into practice, who, for want of proper information, might long have remained ignorant alike of its principles, or their importance. To the credit of Sir John Sinclair it should also be told, that when, in 1799, the private affairs of Mr Elkington had fallen into disorder, he endeavoured to procure for him a parliamentary grant of L.1000, in consideration of the benefits which his discoveries had conferred on agriculture. In this, after some exertion, he succeeded, and was in a great measure the instrument of relieving the distresses of that ingenious and useful man.

It should also be remembered, that it was at the suggestion of Sir John, that the once overpraised, but now as much undervalued Dr Darwin, the author of the *Zoonomia*, *Botanic Garden*, and *Temple of Nature*, was induced to undertake a work on practical agriculture. Nor can it be denied that the *Phytologia*, or *Philosophy of Agriculture and Gardening*,—although, like the lectures of Sir Humphry Davy, of too abstract a description to be of general practical adaptation, abounds with useful observations and ingenious hints, whereof the recommendation of bone-dust as a manure should not be over-

* The reader is particularly recommended to the perusal of Mr Johnstone's work in its improved state, as being the best and most complete work on the subject of draining, which has been yet given to the world. For a more detailed opinion on this subject, we need only refer to the Number of this Journal for September last, in which an attempt has been made to lay its merits before the public.

In a letter to Charles Gordon, Esq., Secretary to the Highland and Agricultural Society, dated January 10. 1835, Sir John Sinclair says, "I am very glad that Mr John Johnstone, land-surveyor, has published another edition of his treatise on draining land. It is by far the best work on that subject that has ever been printed, and does great credit to the author's talents, and extensive knowledge of the subject. I hope, therefore, that the Society will take copies of it, and will recommend it in the strongest manner to the attention, not only of its own members, but also to those societies at home and abroad with whom it is in correspondence."

looked.* It was dedicated to Sir John in the following handsome terms :—" To Sir John Sinclair, President of the Board of Agriculture, by whose unremitting exertions such important improvements have been accomplished in the cultivation of the earth,—that great source of life and felicity ! This work, which was begun by his instigation, and forwarded by his encouragement, is dedicated with true respect, by his much obliged and obedient servant."†

From the attention excited both at home and abroad, by his pamphlet on Longevity, as well as from his bias towards codification, Sir John, shortly after this period, began seriously to turn his mind to an extensive work on the general subject of health, in which he proposed to condense into a manageable form, all the widely scattered materials for such an enterprise, to be found in ancient and modern authors.

In a general point of view, Sir John confesses that one of his main incitements to the undertaking was the ascertaining how far it was practicable to condense and systematise human knowledge regarding any particular branch of science.‡ He, accordingly, with his accustomed perseverance and industry, set him-

* The first notice of the employment of bones as a manure was made in Dr Hunter's *Georgical Essays* (vol. ii. p. 93.), and the discovery is attributed to Anthony St Leger, Esq., a Yorkshire gentleman, so far back as 1766,—another proof how long even the most important and valuable facts may be in arresting public attention. It was afterwards descanted on by Dr Darwin, as we have just mentioned in the *Phytologia* (*vide* sect. 10.), and is briefly alluded to by Sir Humphry Davy in his *Lectures* (page 262). To the Doncaster Agricultural Association, however, belongs the merit of having collected the evidence on the subject, and of having decided on the great value of the discovery. This happened so recently as 1828, when the Association appointed a Committee to make inquiries. The Report was published by Ridgway, London, in 1829.

Sir John Sinclair immediately suggested, that the importation of bones should be encouraged by a public bounty, and that some allowance ought to be given to the captains of vessels, who brought home bones as ballast in their ships. For some years past the importation has become too profitable a speculation in commerce to require encouragement.

† *Vide* *Phytologia, or the Philosophy of Agriculture and Gardening*. 4to. London, 1800.

‡ See Preface to first volume of the *Code of Health and Longevity*, in 4 vols. 8vo. Edinburgh, 1807.

self to the examination of a vast number of publications on the subject of health and longevity, sifted the chaff of crude remark from the wheat of valuable observation, and opened up a correspondence on the subject with many of the most eminent of his medical cotemporaries both at home and abroad. Among the former we find the names of Baillie, Beddoes, Gregory, Currie, Trotter, and Willan; among the latter Rush of Philadelphia, and Chaptal of Paris.*

To a writer who had so eminently distinguished himself on the subjects of finance and of agriculture, it seemed to many rather a strange hazard to attempt success on the field of medical science, and accordingly the Code of Health was commenced in opposition to the opinion of some of his best and most valued friends. Among others, Mr Arthur Young wrote to him in the following plain terms: "I lament every thing you undertake *out of agriculture and finance*;" but Sir John was determined to persevere, and this resolution was in some measure rendered decisive by a communication from the Chevalier Edelcrantz of Sweden, in which he observes, "that the art of preserving health, and giving longevity to man, *forms a link in that chain of useful pursuits*," to which Sir John had devoted all his time.

In the first volume of the Code of Health, he digested the fruits of his reading and correspondence, arranging these under general heads, such as diet, air, and exercise; and, in the other volumes, he gave the sentiments of various writers, alike ancient and modern, as well as communications from a variety of quarters made to himself. Three different plans had suggested themselves to him in the writing of his work. The first was to make it an original one, or one consisting entirely of new matter; but this was given up, as the treatise would have been deprived of a great part of its value, by the exclusion of the opinions of many able and intelligent men, who had already thrown light on the subject. The second was, the compiling from these, and adopting their thoughts, without using their language, or acknowledging their authority,—a method at once defective and disingenuous, and accordingly set aside. The third plan, and that adopted, was the consolidating the essence of the know-

* *Vide* Code of Health, vol. ii. Appendix, No. 2 p. 7.

ledge already accumulated, arranging it in a proper form, and using the words and expressions of the original authors, where such could be done with propriety. Seemingly easy as this was in theory, Sir John found the undertaking, in this case, a very difficult one, from the vast field of inquiry he had to travel over, and the dispersion through numberless volumes of the materials, necessarily forming branches of his principal subject.

The grand divisions which Sir John adopted in the treatment of his subject were the following :—1. The circumstances which necessarily tend to promote health and longevity, independent of individual attention, or the observance of particular rules. 2. The rules which, if observed by an individual, have a tendency to preserve health and existence, even when these circumstances are wanting ; and, 3. The regulations by which the health and safety of a great community are protected from the various injuries to which they are likely to be exposed. Under the first he comprehended circumstances connected with the person of the individual, as parentage, natural constitution, form, sex, &c.—circumstances connected with the mind of the individual, whether relating to the faculties of the mind, or its passions,—circumstances connected with local residence, as wet or dry atmosphere, high or low situation, hot and cold climate, &c.—and miscellaneous circumstances, as rank in life, education, occupation, connubial connection, and exemption from accidents. Under the second he laid down the rules necessary for the preservation of health, as relating to air, diet, digestion, exercise, and sleep,—being the objects *essential* to man in every situation ; as relating to clothing, habitation, amusements, and medicine,—being the articles *highly desirable*, more especially in a state of civilization and refinement ; and *as* relating to miscellaneous articles,—as temper, habits, cleanliness, bathing, relief from accidents, and change of residence. In the third grand division, Sir John treated of the regulations necessary for preserving the health of the community, which he considered under the separate heads of the police of climate, of physical education, of diet, of public amusements, of habits and customs, of public institutions ; and the police of medicine, comprehending the best methods for preserving the health of soldiers and sailors, and for the prevention of contagious disorders.

In the second volume, Sir John Sinclair gives an account of the ancient authors, who have written on health and longevity, with extracts from their works, illustrating the opinions they entertained regarding these important subjects. A second part contains a catalogue of books, both foreign and British, on these topics, and what more immediately relates to them ; and, in the appendix, we have the communications forwarded to the author by his contemporaries. The third volume is dedicated to an examination of the foreign, and the fourth to the British, writers on the subject, with copious extracts from their works.

In looking over these, it must be acknowledged, that we find a great quantity of discrepant materials, and much that might have as well been omitted. But it is obvious that Sir John wished every one to be able to judge for himself, and has amassed together the materials on which his own conclusions have been founded. In this point of view it would have been as well, if the materials of the first had formed those of the concluding volume, as being a general summary of the whole, and as therefore tending less to unhinge the opinions, which are apt to be formed at one time, and unsettled at another by the consecutive opinions of jarring writers.

The first volume, which contains the essence of the work, was translated into German by Professor Sprengel, the celebrated historian of Medicine, and into French by Dr Odier one of the ablest physicians of Switzerland, who highly extols the work for its utility and importance. The translation of Sprengel was from the first edition ; but it was subsequently much improved. After celebrating Hufeland's book on Health, Sprengel remarks, " that in the work of the Scottish author many subjects are considered in a new point of view, many new and remarkable facts are introduced ; and an anxiety to attain completeness is perceived. To this may be added an advantage peculiar to British authors, that of perspicuity, and exemption from the language of the schools. On the whole," he states, in summing up, " the author has communicated the most important results, which reason, experience, and reading have taught him, regarding the effects of external substances on health."

As we have already mentioned, the Code of Health and Longevity was originally published in four large octavo volumes

—in fact in too expensive a form for very general circulation. In the subsequent editions—and we believe they have amounted to five—Sir John very properly condensed his more important materials into one, and thus rendered his researches much more extensively popular, and consequently important. That he was too sanguine in the results, which he expected from his labours on this subject we believe,—as men will continue oftentimes to err, even with their eyes open towards the high road of truth ; but no one can deny the ardour of benevolence, which prompted him to an undertaking, at once so subtle and so laborious. In the Code of Health, he has amassed together a vast quantity of valuable materials, which cannot fail of being useful in themselves, and which have greatly assisted the investigations of subsequent writers on the same or on collateral subjects. It were well if all who have not scrupled to borrow from his mine, had been equally free in confessing their obligations.

Sir John Sinclair thought, and with great propriety, that it might be set down as a maxim in literature, that “ knowledge, previous to its being brought into a condensed state, may be compared to a small portion of gold, dispersed throughout a great quantity of ore. In that rude condition, the strongest man cannot sustain its weight, nor convey it to a distance ; but when the pure metal is separated from the dross a child may carry it without difficulty.” Acting on this principle, he reduced the bulk of the Code of Health and Longevity, as we have just said, from four volumes to one, by condensing its details, and selecting its most valuable materials ; and he then proceeded in the same way with the General Reports and the Statistical Account. In his view of the importance, nay necessity of condensation, regarding art and science, implying by condensation the retaining only the more important facts and observations, and passing over those which either are of minor value, or are no longer useful, Sir John is ably borne out by Mr Mill, the historian of India, who remarks, in his preface to that work, “ that as no fact is more certain, so none is of more importance, in the science of human nature, than this,—that the powers of observation, in every individual, are exceedingly limited ; and that it is only by combining the observations of a number of individuals (or, in other words, forming codes re-

garding each important branch of science), that a competent knowledge of any extensive subject can ever be acquired."

Proceeding in this spirit, Sir John set himself to digest the most valuable materials which had been given to the world on the subject of Agriculture, into one comprehensive volume. The English County Reports had been published in forty-seven octavo volumes, and those of Scotland amounted to thirty more. Seven volumes of communications, besides a number of other works on specific subjects, had also been published by the Board. From these, and from the modern standard works on particular branches of the art, he picked out all the most valuable practical information, and where any topic appeared defective, he made every exertion to render it more perfect, by associating with experienced farmers, surveying their farms, and witnessing their most important operations on the spot. Thus armed, Sir John drew up his Code of Agriculture, the first edition of which was published in 1819. Three editions of it have been since given to the public of this country, besides another in America. It was also translated into the French, German, and Danish languages.

Long previous to this, however, it should be mentioned, that, in a letter to Sir John, Sir Joseph Banks had stated, "that an account of the systems of husbandry adopted in the more improved districts in Scotland, would be of the greatest advantage to the agricultural interests of the United Kingdom; and that it was incumbent upon a native of Scotland, while presiding at the Board of Agriculture, and possessing all the means of information which that situation afforded, to undertake the task. In objection, Sir John argued, that the labour of accomplishing such a task would be very great—that it would be extremely difficult to obtain the necessary information—and that it would afford an opportunity for cavillers to attack the Board on the grounds of its promulgating doctrines which, if acted on, might prove ruinous to many farmers. But all obstacles vanished, when Sir Joseph further urged, "that agriculture has derived, is deriving, and will derive, more benefit from Scottish industry and skill, than has been accumulated since the days when Adam first wielded the spade." This occurred in 1809, but it was not till March 1812, that the whole mass

of materials had been brought together. To do all justice to an undertaking so important, Sir John visited, in person, all those districts which were most celebrated for the cultivation both of strong and of light soils; and he afterwards circulated among the farmers whom he visited, a number of queries on rural subjects, requiring elucidation. By these means an immense mass of valuable matter was accumulated.

When, in 1793, the Board of Agriculture was constituted, the two great objects to which the attention of its members were primarily directed, were the general agricultural state of the country, and the means of improving that state. As the most effectual way of accomplishing this purpose, a number of qualified individuals were employed to draw up the district reports; and, as observed by a distinguished writer on husbandry, "in the course of little more than a year, the Board of Agriculture had printed a body of authentic facts respecting the agricultural, and internal economy of this country, greater than was ever obtained by any other nation since the beginning of time." The collection of district reports having been accomplished, the Board went a second time over the same ground, to have these reports consolidated into those of counties, and drawn up on a uniform and systematic plan.

This was the great object to which the attention of Sir John Sinclair was next directed, and in his address to the Board of Agriculture, on the 9th March 1813, he endeavoured to explain the nature and advantages of making extensive inquiries the basis of condensed information. He then added, "that the power and prosperity of a country depend on the diffusion of useful knowledge, can hardly be questioned; and there is probably no art, in regard to which a variety of knowledge is of more essential importance, than in the art of agriculture. The extent of information necessary to bring it to any thing like perfection, is hardly to be credited. To preserve the fertility of the soil,—to free it from superfluous moisture,—to cultivate it to the greatest advantage,—to raise its productions at the least expense,—to procure the best instruments of husbandry,—to select the stock likely to be the most profitable, to feed them in the most judicious manner, and to bring them to the most advantageous markets,—to secure the harvest even in the most

unpropitious seasons,—to separate the grain from the straw with economy and success,—and an endless variety of other particulars, require a degree of knowledge *to do them well*, of no common description.”

From being in possession of the Statistical Account of Scotland, as well as of the County Reports, it was resolved to commence with that country, and Sir John, for the more entire completion of the task, associated with himself a committee of inspectors for revising the different great divisions of the work, consisting of Mr Rennie of Phantassie, Mr Robertson of Ladykirk, Mr Low of Woodend, Mr Walker of Wooden, Mr Brown of Markle, Mr Walker of Mellendean, Mr Hunter of Glencarse, and the Rev. Charles Finlater of Newlands.

The grand divisions of this national work consisted of accounts of the geographical state and general circumstances of Scotland—of the landed property in Scotland—of buildings as connected with agriculture—and of the occupation of land in Scotland—together with dissertations on the implements of husbandry—on enclosing land, and the nature and advantages of fencing—and on the management of arable land.

The subsequent divisions of the work are devoted to the other branches of rural economy, after which a view is taken of the political economy of the nation, in which we are furnished with very interesting historical accounts of the various branches of our manufactures and commerce. In the volumes which constitute the Appendix, a vast mine of information is opened up, regarding the civil and ecclesiastical divisions of Scotland.

On the appearance of the work, the Farming Club of Dalkeith, which consists of the principal agriculturists of the Lothians, Sir Joseph Banks, and upwards of fifty of the most eminent practical farmers in the kingdom, wrote to the author in terms of congratulation, and expressing their high estimate of its value.* As a work on the husbandry of Scotland could,

* In an unpublished memorandum, Sir John states, that “the proprietors of land in the Lothians, and other improved districts of Scotland, reaped peculiar advantage from the attention that had been directed to the improvement and management of the soil, by the institution of the Board of Agriculture, an instance of which was given by the celebrated farmer Mr Brown of Markle, in East Lothian, who, in a letter dated 5th January 1813, men-

however, only contain information applicable to districts similar in soil and climate, Sir John was then induced to turn himself to the great object of forming "a Code or Digest of Agriculture," on principles of universal application, and suited to all future times. In this he has amply succeeded, and had Sir John Sinclair bequeathed nothing to posterity save that work, his name must have ever been classed among the signal benefactors to the human race.

The first section of the Code of Agriculture is devoted to the consideration of the preliminary points which a farmer should ascertain before setting himself down to the cultivation of any considerable extent of land, particularly climate, soil, subsoil, elevation, aspect, situation, tenure (whether in property or on lease), rent, assessments on, and size of farm. In the second section, an inquiry is made regarding the means essential to secure niceness in farming, namely, capital, regular accounts, arrangement of agricultural labour, farm servants, labourers in husbandry, live stock, implements, agricultural buildings, command of water, divisions of fields, and farm roads. In the third, the various modes of improving land were pointed out, by cultivating wastes, enclosing, draining, manuring, paring and burning, fallowing, weeding, irrigating, flooding, warping, and embanking land. The fourth section is devoted to the explanation of the various modes of occupying land, in arable culture, in grass (including the dairy husbandry), gardens and orchards, woods and plantations. And the fifth, which concludes the work, is occupied in a general consideration of the means for improving a country, the diffusion of information, the removing of obstacles to improvement, and by positive encouragement. In the body of the work only general principles are discussed, and where minute information is necessary, it is inserted in the form of foot-notes; while points requiring farther explanation or detail have separate papers devoted to them in the appendix. The Code of Agriculture by Sir John Sinclair must ever be regard-

tions, that a farm containing 330 Scotch acres of arable land, was just let for L.2700^{per annum}, or at L.8, 2s. per Scotch, or L. 6, 10s. per English acre, which he recollects in his early days did not pay above L.360 per annum, while the occupiers were in a poor condition, and scarcely able to pay their landlord, at the usual term."

ed as the standard work on the state of that science—for he has raised it to the dignity of a science, by establishing its principles—especially as referring to the commencement of the nineteenth century. It is a monument honourable alike to his ingenuity, his untired perseverance, and his general philanthropy. His mind was impressed with the belief that the prosperity of the human race in a boundless measure depended on their knowledge of cultivating the soil, or, in other words, increasing the natural limits of subsistence; and he reckoned no labour too assiduous, no obstacle insurmountable, when such an object occupied his generous enthusiasm. That he left many things imperfect is to be supposed; but that he did more than any single individual ever achieved in this great cause cannot be denied.

In the appendix to the Code, Sir John Sinclair has collected together a great mass of valuable materials, directly or indirectly connected with the subject of husbandry, on the size of farms, on leases, on farming accounts, on vegetation, account of the bills of enclosure for forty years prior to and after the establishment of the Board of Agriculture, on the management of an extensive property, on the making of watering-ponds, on the means of improving the condition of the industrious labourers in husbandry, and on other topics interesting to the farmer. We doubt if there exists in any language a view of agricultural knowledge at once so comprehensive and succinct. No greater proof of this can be afforded than the circumstance already mentioned, of the eagerness with which it has been translated into the continental languages, and republished in America. The reception which it every where received must have been highly gratifying to the feelings of the author, and must have afforded no ordinary solace to the old age of so ardent and indefatigable a philanthropist. Monsieur Mathieu Dombasle of Nancy in Lorraine, who is perhaps the most distinguished agriculturist in the French dominions, translated it into the language of his country, and as Secretary to the Agricultural Society of Nancy, in transmitting to Sir John the diploma with which they had presented him, he takes the opportunity of saying, “I have been for some time occupied in translating your excellent Code of Agriculture. If any thing can contribute to raise agriculture in France to the rank of a science, which we could not till now pretend to do, it

will certainly be the publication of this work in France, being the most systematic, the most concise, and, in my opinion, the most perfect, which has hitherto been written in any language.* An American writer says, "Sinclair's Code of Agriculture, republished here in 1818, is in very high estimation, and is reckoned the most valuable English work on that subject, and better adapted to all countries than any other;"† and to substantiate the truth of the old proverb, that "what every body says must be true," we conclude these testimonials to its excellence by an extract from a letter from Edward Burroughs, Esq. an eminent agriculturist of Ireland. "Upon the whole," he says, "I consider the Code of Agriculture as the most valuable work I have ever read upon that subject; not only from the important information it contains, but from that information being given under a judicious arrangement, and in a style suited to the most moderate understanding."‡

We have already given, at some length, an account of the origin of that great national establishment the Board of Agriculture; and we have clearly seen, not only that the idea of such an institution originated with Sir John Sinclair, but that he was mainly, almost solely instrumental, in maturing its plans, and carrying these into execution, when formed. The labour and fatigue thus caused, would soon have worn out common zeal, more especially as it was attended, not with emolument, but great annual pecuniary loss. It is also admitted, on all hands, that an enthusiasm inferior to that which Sir John Sinclair evinced, in the cause of the national prosperity generally, and in that of its agriculture in particular, must have allowed the establishment, even after it had been put in operation, to have speedily fallen to pieces, so many ramifications of its interests had to be attended to, and so many individuals consulted. It will scarcely be credited, therefore, that, after Sir John had presided over the Board of Agriculture with so much honour to himself, and with so much benefit to the nation, for a period of five years, an attempt should have been made, and that successfully, to deprive him of the President's chair. We have

* Correspondence of Sir John Sinclair, vol. ii. Appendix, p. 35.

† Ibid, Appendix, p. 35.

‡ Ibid, Appendix, p. 35.

no wish here to investigate into the causes of this transaction, or the ways and means by which it was effected. We fear that, throughout the business, Mr Pitt did not act with his accustomed openness and generosity of disposition, although we can scarcely permit ourselves to suppose, that any political differences of opinion between himself and Sir John should ever have been allowed to actuate his conduct. It is true that Sir John differed with the celebrated minister in opinion, with regard to the trial of Warren Hastings, the Westminster scrutiny, and we believe also the Irish propositions; and it has also been surmised by some, that Mr Pitt was not only a little jealous of his influence and popularity on some important national topics, but considered him too independent in his Parliamentary votes. Be this as it may, there can be little doubt, that, through the exertions of Mr Pitt, an opponent was started against Sir John; and that, through his influence, the opposition was a successful one. Most of the official members of the Board were prevailed upon to attend the election, although they had never taken any part in its proceedings before. The Archbishop of York was an honourable exception, and, although applied to, he would not vote against Sir John. To the great mortification of the regular members, Lord Sommerville, who had been prevailed upon, although it appears very reluctantly, to come forward, was elected,—but only by a majority of one. Sir John himself very kindly apologizes for this not very courteous intrusion on the part of his lordship, by telling us, that Lord Sommerville had been informed, that if he did not come forward, some other candidate would be found, or that the Board would be abolished. No unkindly feeling was generated in the breast of the ex-president regarding his conduct in the matter, nor was it allowed to interfere with the friendly intercourse which had formerly subsisted between them.

To the credit and honour of the Board, be it recorded, however, that the first of its acts, under the new President, was the passing of a vote of thanks to the old, for “his great attention to the duties of his office, and for his great zeal to promote the objects of the institution.” A public acknowledgment of services thus publicly rendered, could not fail of being universally considered honourable alike to those who bestowed, and to him

who received it ; and it must have been soothing to the feelings of Sir John Sinclair, allowing that they might have been somewhat wounded on the occasion ; if added to this general expression of the Board, he received from the first Marquis of Lansdowne, from Warren Hastings, and from Bishop Watson, as well as from its treasurer and secretary, letters expressive of their wonder and indignation at the whole proceeding.

Eight years after this unbecoming and untoward transaction, Sir John Sinclair was again installed in the chair, from which he should have never been unseated ; and he continued to hold the situation of President of the Board of Agriculture till 1813, when the vast expense which its management personally involved, and which had considerably impaired his private fortune, obliged him to resign. Lord Macclesfield was President when the Board was finally dissolved, and its papers sent to the Tower of London,—where they may still be seen heaped together in the Record Office, a huge mass of information, which it cost an immensity of human labour and research to accumulate, probably for ever lost to the world.

In 1811, under the administration of Mr Percival, Sir John was appointed Cashier of Excise for Scotland, a situation which he for some time continued to hold. He was then, and thus, obliged to leave Parliament, and was succeeded by his eldest son, the present Sir George, in his seat for Caithness. It should be added, that the emoluments of the situation of Cashier of Excise were greatly reduced at the death of Sir James Grant, the predecessor of Sir John in that office.

Having mentioned the exertions made by Sir John Sinclair to render the discoveries of Elkington of public utility, by having Mr Johnstone appointed by the Board to report on his system, as also to obtain the parliamentary grant for that individual, which rendered his old age comfortable, we must not omit those in behoof of Andrew Meikle, the inventor of the thrashing-machine—unquestionably the most valuable implement introduced into the practice of husbandry during the last hundred years. At the age of ninety-two, he was still alive and in great poverty, and it at once occurred to Sir John, that this opprobrium should instantly be removed by the nobility and landed interest, whom his discoveries had so much benefited. Mr Meik

having been born, and still residing in East Lothian, he addressed a letter to the Earl of Haddington, as Lord-Lieutenant of the county, earnestly recommending the subject to his attention. A general meeting of the proprietors and farmers was accordingly held on the 26th December 1809, and the measure met with unanimous approbation. The sum of L. 1500 was thus raised ; and the family of the unpretending old man, whose invention has been of so much benefit to the world, was thus rescued from the necessities which must have otherwise encompassed them for ever. Sir John had also the pleasure of raising a sum of money for the family of Mr Small, who distinguished himself by his improvement on the construction of the Scotch plough.*

Nor was it, as may have been rendered sufficiently obvious in the course of this biographical sketch, only to one department of human knowledge, or to one branch of human improvement, that Sir John confined his speculations or limited his exertions. In the same year that we find him generously arousing merited sympathy for the unprovided old age of Andrew Meikle, we also discover him endeavouring to give a more extended sphere for the genius of a Humphrey Davy. Although to his more early friends Sir Joseph Banks and Mr Davies Gilbert, that distinguished philosopher was no doubt greatly indebted, yet no circumstance tended more to advance his success in life than his connection with the Board of Agriculture, which, while it assisted his pecuniary interests by a fixed salary, proved also the means of bringing him into communication with a number of eminent characters throughout the kingdom. In 1809, Mr Davy submitted a plan to Sir John for the improvement of the Royal Institution, and for rendering it permanent. This he framed into a bill, and undertook to carry through the House of Commons, for which he received the thanks of the managers, through their secretary, Mr Auriol.

In the year following, Sir John Sinclair was elected a privy councillor ; and, in his correspondence, we find the following short letter of congratulation :—

* For a very interesting biographical account of James Small, and of his improvements in making instruments of husbandry, *vide* General Report of Scotland, vol. iv. Appendix, p. 352-3.

To the Right Honourable Sir JOHN SINCLAIR, Bart.

MY DEAR SIR,

9th September 1810.

I congratulate you very sincerely on your being elected one of the Privy Council. It would be a glorious circumstance for our age if this were to be the prelude to an uniform patronage of the public objects of science and useful art,—on which the glory and prosperity of the country must ultimately depend.

I shall prepare for the press my agricultural lectures as speedily as possible. I am, my dear Sir, very truly, with great respect, your obliged and obedient servant,

H. DAVY.

Sir John was also congratulated, on the same auspicious event, by others of whom the country has reason to be proud, and who, like Sir Humphrey, looked on the circumstance less as a political honour, than as one conferred for great and useful services to his country in particular, and to the world in general. Among these friends we find Dr Adam Smith, Dempster of Dunnichen, Brown of Markle, Arthur Young, and William Wilberforce.

In the same year, Sir John, as President of the Board of Agriculture, had received some communications from Mr Macadam, then residing at Bristol, regarding the system of road-making then practised, which that gentleman regarded as at once inefficient and expensive. He had himself paid great attention to the subject, and being much struck with Mr Macadam's opinions, in the year following, 1811, he moved for the appointment of a select committee to take into consideration the laws regarding the highways of the kingdom. Of this committee he was appointed chairman; and, having got Mr Macadam's information arranged and condensed, so as to render it more attractive, it was in that shape inserted in the appendix to the report of the committee, where it attracted a great deal of attention from the public. The approbation of Parliamentary authority had no doubt a strong influence over the mind of Mr Macadam, in inducing him to persevere in his pursuits, and to improve on his original plans; and, in 1815, his opinions and theories were put into effectual practice by the Bristol District of Roads, 150 miles in extent, being given over to his charge.

So manifest were the advantages, that, a short time afterwards, the Trustees of the Bath Roads also added their district, of about fifty miles. Almost the entire south of England followed the example set to them; and his improvements have been since adopted over the whole kingdom. The debt which the nation owes to Mr Macadam cannot easily be repaid; and the highways of Great Britain, from Caithness to Cornwall, are at this moment quite unequalled in any quarter of the world.

The beneficial effects of the establishment of the Board of Agriculture in this country, naturally led to a similar measure in various foreign states. In Ireland the same plans for promoting improvement have been adopted; and, by county reports and statistical surveys, a great deal of useful information has been obtained. It must have been exceedingly gratifying to Sir John Sinclair to know that his exertions were estimated in foreign lands; and, as founder of the Board, he received, from associations abroad, a greater number of diplomas than perhaps ever fell to the share of any individual either before or since,—from France, Flanders, Prussia, Austria, Saxony, Wurtemberg, Hanover, Sweden, Denmark, Russia, Italy, and the United States of America, having been presented with not less than a quarter of a hundred of diplomas,—agricultural, literary, and philosophical.*

* The list of these foreign diplomas is as follows:—

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| | | 1. The Royal Society of Agriculture at Paris. |
| | | 2. Dijon Academy of Sciences, &c. |
| 1. France, ... | { | 3. The Society of Arts and Sciences at Lisle. |
| | | 4. Society of La Seine Inferieur at Rouen. |
| | | 5. Central Society of the Department <i>Du Nord</i> . |
| | | 6. Agricultural Society of Nancy. |
| | | 7. Agricultural Society of Ghent. |
| 2. Flanders, ... | | 8. Royal Academy of Berlin. |
| 3. Prussia, ... | { | 9. Brandenburg Economical Society. |
| | | 10. Agricultural Society of Vienna. |
| 4. Austria, ... | { | 11. Imperial Royal Agricultural Society of Styria. |
| | | 12. Leipsic Agricultural Society. |
| 5. Saxony, ... | | 13. Wurtemberg Board of Agriculture. |
| 6. Wurtemberg, | | 14. Agricultural Society of Zell. |
| 7. Germany, ... | | 15. Royal Society of Stockholm. |
| 8. Sweden, ... | { | 16. Academy of Agriculture at Stockholm. |
| | | 17. Royal Agricultural Society of Denmark. |
| 9. Denmark, ... | { | 18. Literary Society of Iceland. |
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Early in 1815, Sir John Sinclair was induced to take an excursion to the Netherlands, principally with the purpose of examining into the agricultural state of that country, and of ascertaining the relative prices of grain in Great Britain and the continental corn countries, more especially Flanders and France; the causes of such difference, and the most effectual means of preventing for the future any material variations. He went by Dover and Ostend to Brussels, and thence made a short excursion to Holland, to ascertain the mode of management in the Dutch dairies. While there, intelligence having arrived of Bonaparte's having landed in France from Elba, the commotion excited by that event put it out of his power to carry on the researches which he had intended. He was consequently obliged to limit his inquiries to the state of Flemish agriculture; and, after his return, he threw his observations together in a printed form, in a pamphlet entitled, "*Hints on the Agricultural State of the Netherlands compared with that of Great Britain.*"

In this little work he speculated on the causes of the higher prices of wheat and other grains in England, compared with those in Flanders, which he attributes to the greater expense of cultivation, higher rents, taxes, and public burdens, greater consumption and difference of system. He also collected some valuable information on the means adopted in Flanders for the prevention of the mildew in wheat,—on the advantages of a change of seed,—on the importance of Dutch ashes as a manure,—on the application of rock-salt as a preventive against the rot in sheep,—on the course of cropping favourable to a diminution of fallows,—on weeding,—on winter barley,—on the advantages of flax husbandry,*—on the culture of rape or cole-

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| 10. Russia, ... | { | 19. Imperial Agricultural Society of Moscow. |
| | | 20. Free Agricultural Society of Russia. |
| 11. Italy, ... | | 21. Florence Agricultural Society. |
| | { | 22. Historical Society of New York. |
| 12. United States, | | 23. American Academy of Arts and Sciences. |
| | | 24. Philadelphia Society of Agriculture. |
| 13. West Indies, | | 25. Agricultural Society of Santa Cruz. |

* At a subsequent period (February 1832), Sir John thought these *Hints* on the advantages of Flax of such importance, as to entitle them to republication in a separate form. He allows that in England flax is considered to be a scourging crop; but that the best farmers in Flanders contend that it

seed,—on manures,—on double crops in the same years,—and on various other topics interesting to the farmer. In the Appendix, Sir John throws together a variety of observations on the farm-buildings in Flanders, and the expenses of cultivation; together with some valuable information regarding the lace-manufactures of Ghent.

Sir John was also at some pains to collect tables of the average prices of wheat, barley, and oats, in England, for the last half century; and of the same grains in Flanders during the same period, for the purpose of ascertaining whether the practice followed in the latter country, of brewing malt liquor partly with wheat in a mixture with barley, might not be advantageously adopted in this. From the high price of wheat at that period in England, he found that it could not then be tried; but, at a subsequent period, when that price became so low as scarcely to afford a remunerating return to the farmer for the expenses of cultivation, he circulated a printed sheet recommending its adoption. In his investigations on the subject, Sir John learned, that the best proportion for making malt liquors from this comixture of grains, was in using eighty parts of wheat with fifty-two of barley; and that beer thus made is stronger, and keeps much better, than when made from barley alone; but that it is unfit for use for a year, after which it continues to improve for an indefinite time.

In an addendum to the Appendix, Sir John has given the translation of a curious and interesting paper “On the Principal Accidents and Diseases to which Wheat and other Cereal

may be raised once in six years without the least injury to the soil, which in the course of the culture is completely cleared of weeds, and produces a better subsequent crop of wheat or rye than after fallow.

He afterwards adds, “When it is considered that the profit arising from a crop of flax is so much superior in value to the usual produce of grain crops, the high rent that can be afforded, and the great numbers of people that might be employed in all the various branches of the manufacture, one may form an idea of the advantage that may be derived, by a general adoption of this culture. It is quite a mistake to suppose that valuable land is necessary for this crop. Under proper management, light soils would produce it in abundance and perfection, provided the land for the previous crops were properly dunged, and rape-cake sown with the flax.”—*Hints on the Advantages of Flax Husbandry and the Linen Manufacture, as practised in Flanders*, p. 3.

Plants are liable, and the means which may be employed to prevent them,"* from the French of Mons. Desmazieres of Lisle. It contains a clear yet concise account of the observations and experiments of M. Tillet, L'Abbe Tessier, and M. Benedict Prevost, all writers whose works have thrown the greatest light on agricultural subjects generally, and on the physiology of vegetables in particular. The diseases treated of are the Smut, the Rust, the Charbon or Mildew, the Spur or Ergot, and the Running,—a term which, when applied to *flowers*, is synonymous with *miscarriage*, and to *fruits* with *not setting*.†

With reference to the observations made by Sir John in the Netherlands, it may be added, that, after the lapse of ten years from the date of his excursion, when the prices of wheat had fallen very low, and the war leases yet remained in operation, he considered the extinction of the malt tax as indispensably necessary, not only as regarded barley, but also wheat lands, for the commercial prosperity of the agriculturist. To supply any deficiency which such a plan would occasion, Sir John suggested the conversion of the four millions and a half of temporary annuities into perpetual stock.

We may here mention, that Sir John Sinclair, in the course of his life, made five visits to the Continent. We have already

* "Agrostographie des Departemens du Nord de la France. Par J. B. H. J. Desmazieres. Lisle, 1812."

† From the section on Smut we extract the following anecdote, less, perhaps, from its value than from its graphic character. It is quoted from "*Le Cours complet d'Agriculture*."

"A farmer, on working the lands of a rich commonery at Malta, was found by M. Herdoun, sitting on a sack of seed. It was on a beautiful day, the sun shining brilliantly, and not a cloud to be seen. M. Herdoun went up to him, and asked him why he was not sowing? "Because the land is ill," said the labourer. "What is the matter with it?" replied M. Herdoun. "It sweats (said the other); stoop down, and you will see a cold vapour coming from it. I am sixty years old, and this was pointed out to me by my father. I shall wait, or else I shall have black wheat." He considered this transpiration as having an influence upon the seed, if sown during its occurrence. This labourer added, that in the preceding year there had only been two days proper for sowing, and that the harvest was most abundant, while the part of the field which was sown in unfavourable weather produced a prodigious quantity of smutted corn."

alluded to his tour to the south of France in 1775, along with his younger brother ; his journey to Paris towards the end of 1785, in which he made the personal friendship of Buffon, and Necker, and entered upon an agricultural correspondence with the Count d'Hauterive, M. Dombasle, De Marniere, Tessier, Sylvestre, and De Lasteyrie ; and his more extended travel through the northern countries of Europe in 1786, in which he so extensively enlarged the circle of his distinguished acquaintances, and also the sphere of his personal observations. In 1814, he made the excursion to the Netherlands, during which he collected materials for the agricultural work on that country, which we have just noticed ; and in 1815, he again revisited these provinces, and France, soon after the battle of Waterloo.

The agricultural observations, which Sir John made on the state of France in 1816, may be summed up in a few words. He found it, generally speaking, in a very deficient state ; and, from many circumstances, thought it much more likely to degenerate than to improve. In the large farms of Picardy, he observed four horses in a plough, so that some farmers, with fifty horses, had only fifteen ploughs in operation. All the ground in that province was cultivated ; but, in the opinion of Sir John, more corn would have been raised if they had ploughed one-third less ground. Their climate is said to be too dry for turnip crop ; and their sheep are comparatively few in number : the Merino breed, which had been introduced, were skilfully managed, and greatly esteemed among the agriculturists. From the law instituted during the Republic, and, we believe, not yet repealed, by which possessions are, at the death of the parent, equally divided among his children, Sir John was decidedly of opinion, that agriculture was materially injured ; as the proprietors were thus apt to be reduced to a state of indigence, and in their distresses involved the farmer,—thus taking away any little capital which might be useful in rural improvements.

The sudden change in the state of the country, which followed the termination of a war of such long standing produced consequences which plunged tens of thousands into distress ; and, on his return from his Continental excursion, Sir John found distress abounding in almost every district throughout Great Britain. Agriculture, trade, and commerce, had each alike been

forced in unnatural channels, and for so long a period, and to so great an extent, that the return to that state which peace and a surplus population necessarily brought, was attended with miseries to vast multitudes, who little expected, and were less prepared, to meet them. With his usual active philanthropy, he accordingly set himself to consider the causes, as also, the most probable cure of this national malady, and, in the October of the same year, 1815, he published a pamphlet, entitled "Thoughts on the Agricultural and Financial State of the Country; and on the means of rescuing the Landed Farming Interests from their present depressed state."*

In this brochure, after taking a view of the dreadful state to which the tenant had been reduced by the return of peace prices, while he was obliged to pay a war rent, the causes of mischief are treated of under three separate heads: scarcity of money, weight of taxation, and foreign importation. Sir John then went on to shew, that the landed interest could not bear their existing burdens, if the circulating medium was diminished, and the prices of produce remained the same; and that a struggle must therefore necessarily ensue, between that and the monied interest, in which either the one or the other would be forced to give way. He then pointed out the absurdity of permitting the produce of foreign harvests to interfere with our domestic industry, while that industry was borne down by a load of taxation, which the other escaped; and, that a protecting duty was not alone sufficient to save either the landlord or farmer from ruin. The suggestions which Sir John considered as most available at the time were,—an increase of currency, a bounty on exportation, and public loans for the benefit of the farmer and landlord.

As relating to this period, we cannot resist quoting the following merited eulogium on the character and services of Sir John Sinclair, from the *Monthly Magazine* for May 1814.

"Sir John Sinclair, after devoting forty years to the service of his country, has resigned his honorary situation of *President of the Board of Agriculture*, and is succeeded by the Earl of Hardwicke. About two years ago he declined, in favour of his son, to become a candidate for his long continued seat in Parlia-

* London, Bulmer and Co.; Edinburgh, Constable and Co. 8vo, p. 16.

ment ; and has consequently now retired from public life. On such an occasion, we cannot let pass the opportunity of expressing our regret, that the stern course of nature has thus deprived the country of the active services of one of those men, whose name and character will always be honourably associated with the times in which we live, whose philosophical spirit has accelerated the progress of civilization, and whose labours have tended to improve the social condition of mankind. Of the benefits derived by the country from the exertions of Sir John Sinclair it is impossible to present even a brief enumeration. They are to be found in the extended and improved cultivation of the soil, and in the consequent increase of the means of subsistence ; in new and improved roads joining all parts of the empire ; in extensive enclosures ; in canals ; in fisheries ; in improved buildings ; in useful machinery ; and in all branches of the arts of life. Of several of these Sir John has been the successful projector, of others the effective promoter, and of many the zealous patron. Nor has his unwearied industry been limited to the execution of single objects, about which some men employ their entire lives ; but his mind has expanded from individuality to the great principles of science and social economy. Our libraries, as long as the language endures, will attest his comprehensive and patriotic views, in the County Surveys of the Board ; in the Statistical Account of Scotland ; in the Statute Book, and Parliamentary Reports ; and in various works on the Revenue, and even on subjects of Health, Longevity, and Polite Literature. If the reign of George III. has been distinguished above that of any sovereign, for the general improvement of the face of his empire, the mind which in a great measure conceived, impelled, and directed this system of improvement, was that of Sir John Sinclair. Yet, this useful man has always been a mark for those bad passions which are engendered by inferior intellects, and the boldness of his plans have so often afforded topics for the exercise of inconsiderate wit, and the declamations of prejudice, that his true character will not be generally understood, till its worth is felt in its loss. The mob of mankind, who are misled by the tinsel of military glory, the superficial glitter of eloquence, or the accumulation of great wealth, are incapable of appreciating the silent effects of social improvements ; but we confess, that if it

were in our choice to select the path of glory which wisdom and the better experience of mankind will consecrate, we should prefer the distinctions arising from the useful and unequivocal career of a SINCLAIR, to any renown attached to the splendid achievements of a BUONAPARTE, the fascinating eloquence of a PITT, or the unmeasured wealth of a BARING.*"

We have already endeavoured to shew the anxiety, which Sir John Sinclair on all occasions evinced to do justice to the merits of the living, who deserved well of their country ; and to his ardent mind it must have conveyed a gratification as high, as it was disinterested, that his endeavours were in so many instances crowned with all the success he could either wish or anticipate. Efficient services were thus rendered to the families of many yet alive. But his zeal extended far beyond this limited circle, and, in his Code of Health and Longevity, and in others of his works, where the literary services of the long departed are descanted on, we can see the same earnest endeavour to give a fair field to the merits of those, now known to the world only through the medium of the works they have bequeathed to posterity. The enthusiasm of Sir John in the cause of our great Celtic bard, Ossian, above all, must not be overlooked, various circumstances having contributed to impress him with a thorough conviction of the authenticity of the attributed works.

It appears that Mr Macpherson not only left behind him a collection of manuscripts of the original Gaelic poetry, but also a legacy of one thousand pounds to his executor, John Mackenzie, Esq., to defray the expenses of their publication. Arrangements with Messrs Nicol and Bulmer, of London, were accordingly made for that purpose ; but after the printing off of the first sheet, Mr Mackenzie unfortunately died. His successor, a gentleman of the medical profession, instead of following out the task, thought it better to let it devolve on the Highland Society of London ; and the MSS. were accordingly put into the hands of their secretary. In May 1804, a committee was appointed, consisting of Sir John Macpherson, Sir John Macgregor, John Macarthur, Esq., Portman Square, who took a very active part in the undertaking, Alexander Frazer, Esq., of Lincoln's Inn, the secretary, and Mr Colin Macrae, of the Temple,

* Monthly Magazine, May 1. 1814.

the deputy-secretary of the Society. Of this committee Sir John Sinclair was chosen President.

After much labour, and the overcoming of a variety of obstacles, it was not till 1807 that the work made its appearance in three octavo volumes; and Sir John himself declares, that there was no literary undertaking from the completion of which he ever derived more satisfaction.*

In refutation of the scepticism of the late Dr Samuel Johnson and others, Sir John shews, that it is manifestly unlikely that Mr Macpherson should first have composed the poems of Ossian in English, and while yet wishing to be supposed the author of them, should have taken the trouble of translating them into Gaelic, or that he should afterwards leave a sum of money behind him for the publication of that Gaelic version. Sir John then proceeds to examine the point, whether the Gaelic was not the original, and the English a translation from it, and he thinks, that, on an impartial examination, it will be admitted that in many parts the English translation of Macpherson conveys but a very faint and imperfect idea of the singular beauties of the original. In discussing the question, "Whether that original is not genuine ancient poetry?" Sir John brings forward various circumstances to prove that the Celtic tribes generally were much addicted to poetry,—that various Gaelic poems did exist in the Highlands and Islands of Scotland in remote periods of our history, the greater proportion of which were said to have been composed by Ossian, the son of Fingal,—that various manuscripts, long antecedent to the days of Macpherson, existed, in which these poems were contained; and that a great store of Gaelic poetry, and more particularly of poems ascribed to Ossian, had been handed down from generation to generation by oral tradition.†

* Vide Correspondence, vol. i. p. 330.

† "A gentleman from the Isle of Skye (Captain John Macdonald of Breakish) came to reside," says Sir John, "on my estate in Caithness, who was much distinguished for his knowledge of Gaelic poetry, and who had furnished Mr Macpherson with several of the poems he had translated. Being examined on oath before a magistrate on the 25th September 1806, Captain Macdonald declared, 'That he was then in the 78th year of his age: That when young he could repeat a great many of Ossian's poems of different lengths and

The discussion throughout has been a curious one, but it would be out of place in the present agricultural memoir of Sir John, to enlarge on it here. Suffice it to say, that a great part of the mysticism in which this subject has been involved undoubtedly originated with Mr Macpherson himself, whose pride, like that of Bruce the Abyssinian traveller, would not allow him, when his veracity was disputed, to descend to that defence, which it was assuredly in the power of either to make, and that explanation of circumstances which he could so easily have given.* In the dissertation prefixed to the edition published by the Highland Society, Sir John brings forward two additional circumstances, which put the antiquity of the poems in a much stronger position than they ever before held. One of these is the fact that a manuscript of the Ossianic poems did actually exist at Douay in Flanders previous to the time of Macpherson's publication; and the other, by finding that Swaran and other personages mentioned in these remains have their existence authenticated by the Danish historian, affords not a positive yet a strong collateral evidence of their authenticity. The first book of Fingal, as a specimen of the new translation, was drawn up by Dr Ross, and inserted in the Gaelic edition; and on comparing that with the paraphrase of Macpherson, the celebrated Joanna Baillie remarks, "That it is less pompous, more simple, and more appropriate than the latter; and besides being free from those particular images and forms of expression which

numbers of verses, which he had learned from an old man about eighty years of age: That he was well acquainted with the late Mr James Macpherson: That he had met with him at the Rev. Dr John Macpherson's house in the Isle of Skye: That he had sung many of those poems to him; and that Mr James Macpherson took them down as he repeated them."—Correspondence and Reminiscences, vol. i. p. 328.

* The words of Dr Johnson's scepticism are well worth quoting. Samuel asserts, "That the poems of Ossian never existed in any other shape than that which we had seen; that the editor or author never could shew the original, nor could it be shewn by any other; that it was too long to be remembered; that the Gaelic language formerly had nothing written; and that the editor (Macpherson) had doubtless inserted names that circulated in popular stories, and might have translated some wandering ballads, if any could be found; and that the names and some of the images being recollected, make an inaccurate auditor imagine, by the help of Caledonian bigotry, that he had formerly heard the whole."—*Journey to the Hebrides*, p. 205.

in his (Macpherson's) seem to be borrowed from other sources, it presents us with the story, and the images and sentiments that enrich the story, in a more distinct and defined manner, avoiding the great repetition of general epithets, which give to the other, notwithstanding all its beauties, a fatiguing sameness of which many readers have complained. This, I think, must impress the public at large with a belief that the Gaelic copy is the original, and Macpherson's a translation,—a translation, too, by a writer of a different character from the elder poet.*

Mrs Grant of Laggan, a very competent judge of such a matter, writes, after perusing the dissertation drawn up by Sir John, to prove the antiquity of the poems, "Your valuable work has had with me the effect of making 'assurance doubly sure;' in regard to the Ossianic remains, I hope the clear and complete evidence you have so industriously collected and arranged in lucid order, has confirmed the wavering, and in many instances converted the unbelieving. We Highlanders owe much to you on this score. It was particularly hard that we should be branded as a confederacy united in sanctioning an imposture, and that by those who never took pains to investigate the subject. This you have done in a manner honourable to your own candour, and generous to a class of your fellow-subjects long neglected, and often misrepresented."

Before leaving this subject, we may be permitted to make a few observations on the merits of the Ossianic writings themselves. Such was the despotism, at the time of their publication, exercised by Dr Johnson over English literature, that they were saved from oblivion simply by their intrinsic beauties; whereas, on the Continent, in France, in Germany, and more particularly in Italy, the excellences of the great Celtic bard were at once appreciated and proclaimed. Buonaparte slept with a copy of Ossian under his nightly pillow during his Italian campaigns; and Madame de Stael, in her great work "*De la Littérature*," acknowledges but two distinct descriptions from which all others proceed, one of which had its origin in the south with Homer, and the other in the north with Ossian.†

* Sir John Sinclair's Correspondence, vol. i. p. 333-34.

† "Il existe, ce me semble, deux littératures tout-à-fait distinctes; celle qui vient du midi, et celle qui descend du nord; celle dont Homère est la première source, celle dont Ossian est l'origine."

Malcolm Laing, Wordsworth, Moore, and it is to be feared Sir Walter Scott,—for the hits in the *Antiquary* but too clearly point out his leaning to scepticism,—afterwards ranged themselves under the banners of Samuel Johnson. But admitting that the manner in which Macpherson brought forth his work justly gave rise to doubt in the minds of many, and has since furnished an ample field for hypothetical conjecture and antiquarian research, such circumstances ought to have no weight as to the intrinsic value of the writings themselves. Ireland's additional plays of Shakspeare attracted notice, solely because they were foisted upon the world as productions of the bard of Avon, and they fell into oblivion, not because they were discovered to be fabrications, but because they were found wanting when weighed in the scales of literary value; while, on the other hand, the writings of Chatterton keep their ground, although every one is aware that they are the compositions of the boy of Bristol, and not of the fictitious Monk Rowley. Age or scarcity can confer no true value on any thing; yet with some they are permitted to do so, whether the trifle be a cracked Roman jug, or a Queen Anne's farthing. Many, accordingly, who believed Ossian to be only an effusion from the pericranium of Macpherson, could content themselves with nothing less than a wholesale condemnation of the poems as a tissue of rant, bombast, and fustian, as if there was no such thing as sterling merit, or as if a standard of poetical excellence could exist only in the fancy of the reader; while, on the other hand, they who felt convinced of his authenticity awarded him no lower a situation in literature than by the side of the Homers, Dantes, Miltons, and Shakspeares. Truth here, as in most other things, seems to lie between. The works of Ossian, in the state they are served up to us, may be considered rather as the raw materials of poetry, than as exhibiting that art, condensation, and selection of ideas and images requisite to form a finished composition. There is a thronging,—a profuse assemblage of lofty and magnificent imagery, seen in the distance, rapidly shifting, shadowy and indistinct; “The glory and the splendour of a dream,” united with its obscurity and its perplexing remoteness. We hold not converse with human flesh and blood, but with heroic spectres “who pace about the hills continually,” and that come

to us in beckoning silence from the hoar billows of the ocean. There are neither cities, nor civilization, nor society, but the wanderings, the wars of men, and impulses of nature, and passion in its untamed empire. Mossy stones mark out the dwellings of the mighty dead; the wind curls the wave, and swells the sail, and agitates the forest; and the silence of night is broken by gibbering voices, and "airy tongues that syllable men's names on sands and shores, and desert wildernesses." Yet in the narration of the adventures, and in the construction of the fables, a wonderful stretch of invention is exhibited, and a method is visible even in the most irregular and seemingly inconsistent parts, which is not a little surprising. The Epic of Fingal contains some scenes and passages of heroic beauty which would thrill the blood of a coward, and make him long to be a soldier; while the songs of Selma abound in touches of pathos as deep as they are artless.

Sir John Sinclair, after having devoted his labours to the bringing before the public a Code of Agriculture, a Code of Health, a Code of Statistical Philosophy, and the principles of a Code of Finance,* determined on concluding his literary achievements with "A Code or Digest of Religion." A plan of this great work was drawn up so far back as 1819, and the introduction to it was sketched out; but the pressure of cotemporary matters, together with the strong interest which the author took in the currency question, and in the schemes which were in agitation for the protection of agriculture, compelled him to draw away his attention from every other more remote pursuit. We are informed, that, in this introduction to the proposed code, the writer proceeds on the supposition that he had undertaken the instruction of an individual, who was either altogether unacquainted with revealed religion, or who had imbibed very limited or erroneous views concerning it;—indeed, much in the way that the Hon. Mr Ward's truly excellent and ingenious novel of Tremaine is conducted. For this purpose, the pupil is led through a system of progressive instruction.

* There is annexed to the third edition of the History of the Public Revenue of the British Empire, an analysis of the sources of public revenue in general, which is drawn up as the basis or foundation of a "Code of Finance."—*Vide Appendix to Account of Husbandry of Scotland*, p. 98.

He is presented with a general view of human nature, comprehending, first, the corporeal frame, and, secondly, the mental faculties of man—then, with an account of the globe, where the Creator has placed him—then, with that of the heavenly bodies by which the earth is encompassed. Rising from nature up to nature's God, it was next intended, reverentially, to contemplate the being and attributes of Him by whom all things were made, and through whom all things live, and move, and have their existence. It was then intended to inquire whether any revelation of the Divine Will had ever been made to the human race, and, if so, where the best account of that revelation was to be found. It was intended that the work should conclude with an examination and explanation of the precepts and doctrines thus promulgated to man, to guide him in his conduct here, and lead him to the enjoyment of the promised happiness hereafter.

When the sketch of the first portion was completed, Sir John had it printed off, and distributed copies among a few of his more particular and intelligent friends. Among others, two prelates of the English Church expressed themselves in letters to the author, regarding the utility and importance of such a work; and Mrs Hannah More—a name dear to the best and highest interests of the human race—being at the time confined to a sickbed, commissioned a friend to express to the author her high approval of the plan of the work; her full appreciation of the labour and research which such an undertaking would require; and the value of bringing within a manageable compass so large a mass of religious and moral instruction. In short, it appears to us that Sir John has here nearly forestalled the idea of the *Bridgewater Treatises*, avoiding their only fault, as viewed in a popular light, the want of that condensation, which would have brought the subjects more directly, and in more generalized views, before the reader.

With reference to the same year, 1819, we may mention the circumstance of a printed paper having been circulated by Sir John, "On the superior advantages of the Codean System of knowledge." After alluding to the immense number of volumes which have been published regarding almost every separate branch of art and science, and which many, who feel the am-

bition to be well informed, have neither the ability to purchase, nor the time to peruse; and after pointing out the defects of the encyclopædial system in remedying of this want,—every department of knowledge being divided under a variety of heads; scattered alphabetically through a series of volumes,—he shews the merits of the codean system, where every branch is discussed in its separate and particular volume.

With his usual philanthropic views, which were often, alas! but imperfectly seconded, Sir John suggested that the general peace, then existing, formed a very proper period for making a common effort throughout the countries the most distinguished for scientific and literary acquirement, for ascertaining the state of human knowledge; and, by condensing its more valuable materials, thus lay a sure foundation for future improvement. The conclusion of the paper is curious; and when we consider the number of associations and societies which are now walking in the very footsteps which he here pointed out to them, many who, at this moment, are quite unaware of the fact, will be rendered sensible of the services which Sir John Sinclair has, even in this way, rendered to the cause of science and civilization. "A brief exposition of the advantages that may be derived from the codean system," he says in conclusion, "is thus submitted to the consideration of the reader. The plan may in fact be executed by one man; but a considerable expense, and a combination of talents, are necessary, to go through every subject that ought to be discussed, and so make the system as perfect as it may and ought to be rendered. It is now, however, brought into that state, that the assistance of the liberal, the well-informed, and the public-spirited, will insure its success. For that purpose, it is proposed that an association shall be formed, "*For the Collection and Diffusion of Useful Knowledge.*" The expense to the ordinary members to be £1 per annum, &c. Those who wish to become patrons of the proposed undertaking to subscribe such sums for carrying on the correspondence—for purchasing books—for collecting the necessary information, both at home and abroad—and for the expense of drawing up the several volumes, as, in their judgment, the utility of the measure may seem to merit."

How successfully this plan of Sir John Sinclair has been acted upon, it is needless for us to say.

We have stated, that the great projected work of Sir John Sinclair on the subject of revealed religion was prevented from being carried to a completion, from the controversies at the time fiercely agitated regarding currency and agriculture.

In his History of the Revenue of the British Empire, it will be seen, that, to the former subject, Sir John had devoted profound attention; and it continued at all times as being intimately connected with our national prosperity and happiness, to occupy a great part of his thoughts. When, in 1810, the report of the Bullion Committee was rendered, he reckoned the conclusions to which they had come so dangerous to the national welfare; that he drew up a tract in answer, and, before publication, submitted it to the then premier Mr Percival. The public saw at once, and appreciated the soundness of the views it contained; and it materially assisted in stemming the torrent of delusion which then prevailed, and which, if not arrested, must have curtailed the resources of the country, and disabled Great Britain from contending with the energies of France, at that time bent on the subjugation of Europe. A number of the great merchants of London transmitted to Sir John their acknowledgments of the services he had rendered the nation by his publication, and requested permission to translate it into French for distribution on the Continent; as also, to print an edition of it in English, for the use of our principal commercial cities, and for America.

It was no doubt necessity that compelled Mr Pitt, in 1797, perhaps the most gloomy and appalling era of our whole national history, to make trial of a paper currency; but there can be as little doubt, that the bold experiment then saved Great Britain from ruin and bankruptcy. When specie ceased being paid at the Bank of England, the country, instead of falling into utter misery, as had been so vehemently predicted, rose triumphant over its difficulties, and such a strength was imparted to our productive powers, that we were enabled to subsidize all the nations of Europe at one period, and to resist and conquer them at another. But the death of Mr Pitt, and the

subsequent assassination of his successor Mr Percival, having thrown the reins of government into the hands of the second Lord Liverpool, that nobleman had imbibed from his father the idea, that gold only should be fixed upon as the standard of value—his Lordship having written a book to recommend that system, whose rejection cost him so much disappointment and vexation as to be said to have hastened his death. From hereditary attachment to his father's plan, the son resolved on establishing it; and, in the opinion of Sir John Sinclair, it was the adoption of this system, which brought so many and such frightful subsequent evils upon the country, and, among others, the panic of 1825, by which commerce was reduced almost to a state of barter. He also attributed the diminution of our revenue, and the ruin of our agricultural interests, to the same cause. It also unquestionably tended to the unsettling of men's opinions; and the political convulsions of 1832, whose effects are yet at work, and whose consequences it is still impossible to foresee, may be traced to the same source.

In a preceding part of this memoir, we mentioned the establishment at Edinburgh, in 1791, of the Society for the Improvement of British Wool, and we also gave a short account of the first sheep-shearing festival at Newhalls Inn, near Queensferry, in the following year. It should be added, that, in imitation of it, similar meetings were instituted in Woburn Abbey by the Duke of Bedford, at Holkham by Mr Coke, and at Workington by Mr Curwen. By means of these exhibitions, the first impetus to which was given by Sir John, the art of agriculture excited public attention, and a knowledge of it became fashionable.

These sheep and cattle shows having succeeded so well in various parts of the empire, Sir John Sinclair felt anxious that they should be patronised by the great agricultural association of Scotland, the Highland Society; and he accordingly proposed at a meeting of Directors, in 1821, that the subject should be discussed by a committee of their number. A favourable report having been rendered, the committee recommended that the suggestion should be acted on experimentally for one or more years; and, at same time, submitted a list of the premiums

which, in their estimation, might be with most utility competed for.

The first show took place in Edinburgh on the 26th December 1822, and they were held exclusively there for the four succeeding years, during which time a gradual extension was made of the objects. At first these were confined simply to fed sheep and cattle, but latterly lean and breeding stock were included, roots, seeds, and implements of husbandry. In 1826, the show was held at Glasgow; in 1827, once more at Edinburgh; in 1828, again at Glasgow; in 1829, at Perth; in 1830, at Dumfries; in 1831, at Inverness; in 1832, at Kelso; in 1833, at Stirling; in 1834, at Aberdeen; and in 1835, at Ayr. The meeting for the present year will be celebrated at Perth. On all occasions their success has been complete, and, from the generous encouragement successively held out by the districts more immediately interested in the exhibitions, the premiums have progressively extended both in their amount and in their variety.

Besides the publications already mentioned, most of them in a way little adapted to their plan and magnitude, we have before us on our table no less than thirty pamphlets and tracts, presented by Sir John Sinclair to the world since 1821. Although our limits will only allow us to notice the contents of the three most considerable of these, it may give some faint idea of the indefatigability of Sir John Sinclair's mind to annex the dates and titles of the others.

1. Hints as to the most advantageous mode of managing the Merino Breed of Sheep in Caithness, 1821.
2. Translation of a Letter from Monsieur de Dombasle, President of the Central Agricultural Society of Nancy, to the Right Hon. Sir John Sinclair, 1821.
3. Plan for re-establishing the power and prosperity of the British Empire, by an improved system of Circulation, 1822.
4. On the Corn Laws, and the improvements of which they are susceptible, 1822.
5. Account of the Translation of Sir John Sinclair's Code of Agriculture into French, by M. Mathieu de Dombasle of Metz, by Devilly, 1826.
6. On the importance of Oil as a Manure, 1826.
7. Political Axioms, pointing out the advantages of a Paper Circulation, 1828.
8. Hints regarding the objects of the extensive inquiry that has been carried on into the Culture and Uses of the Potato, 1828.

9. Brief statement of the Corn Question, 1828. 10. Plan for enabling Government to reduce Taxes to the amount of four millions Sterling, 1830. 11. On the means of improving the condition of the industrious Labourers in Husbandry, and effectually relieving their distresses, 1831. 12. Resolutions submitted to the consideration of the Agricultural Classes, 1831. 13. On the extinction of the Malt Tax, 1831. 14. Letter to the Lord Lieutenant of Ireland on the means of alleviating the distresses with which Ireland is now afflicted, and preventing future scarcities, 1831. 15. Thoughts by the Right Hon. Sir John Sinclair regarding his proposed literary labours, written on his birth-day, 1831. 16. On the Corn Laws, and the necessity of protecting the landed and farming interests from the ruin with which they are now threatened, 1832. 17. Letter from the Right Hon. Sir John Sinclair to Thomas Atwood, Esq. of Birmingham, on the Currency question, 1832. 18. Defence of Agriculture, the final effort of an old friend to the cause of British Agriculture, by Sir John Sinclair, in the seventy-ninth year of his age, 1832. 19. Account of the origin of those "Cattle Shows," and other Agricultural Meetings, which have tended to excite a spirit of improvement in England and Scotland, 1833. 20. Plan for preventing the fatal Political Revolution with which we are now threatened, 1833. 21. On the necessity of preserving the Corn Laws, and resisting with spirit and energy any attempt to repeal them, 1833. 22. On Shell Marle as a manure for Turnips, 1833. 23. Hints on Vegetation, the agents necessary for the production of plants, and those which are injurious or destructive to them, 1834. 24. On the destructive consequences that would result from encouraging the importation of Foreign Corn, 1835. 25. Translation of Letter from M. Julien de Paris to Sir John Sinclair, 1835. 26. On the necessity of a total repeal of the Malt Tax, the immense advantages that would result therefrom, and the practicability of the measure proved, 1835. 27. Important hints, earnestly submitted to the consideration of those who are Friends to Agriculture, 1835. An effectual means of restoring the prosperity of the country, by the issuing of small Notes, convertible into silver. This was Sir John Sinclair's last effort in the cause of British prosperity, and we are uncertain whether or not it has

ever been published. The copy before us is proof, and has the manuscript alterations and additions of the venerable author. Those on the penultimate page are so tremulously written as to be almost illegible. The two more elaborate treatises, of which it is incumbent on us to take some notice, are, one "On the Culture and Uses of the Potato;"* and the other, "Thoughts on Currency, and the means of promoting national prosperity by the adoption of an improved Circulation."† We have no doubt that many others (for witness the hiatus from 1822 to 1826), of which we have no copy, as well as a number of communications in the periodical publications, some of which we could enumerate, were the productions of his ever active mind during the same period, which to him, although that of old age, was not that of idleness.

In his treatise on the potato, Sir John Sinclair was at great pains to collect together all the information afloat, both regarding the cultivation and the uses of that admirable esculent. It is well known that the principal objection which has been hitherto urged against the culture of the potato is the great quantity of putrescent manure which it requires. Sir John, however, thought the fact, on inquiry, proved, that, by the addition of salt and gypsum, two-thirds of the quantity of dung previously used will raise, not only as large a crop, but also one of superior quality.‡ Sir John then treats of the conversion of the potato into meal, and on the mode of manufacturing bread by a mixture of potato jelly with wheaten flour. In the various chapters of the work, the history, the varieties, the different modes of culture, the distempers and accidents, the quantity of produce, the expenses of raising, and the various modes of preparing the potato for food, whether for man or the lower animals, are treated of; while, in the appendix to it, a great quan-

* Blackwood; Edinburgh, 1828, pp. 96, 8vo.

† Hatchard and Son; London, 1829, pp. 136, 8vo.

‡ Monsieur Mollerat, an eminent French chemist, found "That the dung of animals promotes the vegetation of the plant *in the stem*, but that gypsum, mixed with the soil, *produces a greater quantity of roots*."—*Traité des Pommes de Terre*, par Messrs Payen et Chevalier Paris, 1826.

Mr Weston of Leicester made nearly the same observation in England.—*Report on Potatoes*, p. 13.

tity of curious and valuable information is massed together regarding its qualities, and their adaptation to useful purposes.

The treatise entitled "Thoughts on Currency," was published in the following year, 1829, and shews alike the flexibility, as well as the industry, of Sir John Sinclair's mind. He sets out with the preliminary maxims, that when a low price of gold is established in this country, and gold is the sole standard of value, it virtually fixes by law a price, equally low, on all commodities, and every species of property; and that foreigners, in particular, will not give us high prices for our productions, if they are enabled to pay for them in gold, fixed by law at a low price. On the other hand, Sir John sets it down, that a high price of gold fixed by law, is a certain means of maintaining our commodities at high prices, greatly to the advantage of the revenue, and of the agricultural, manufacturing, and other productive classes, whose interest it is the paramount duty of every government to promote. He then proceeds to argue, that the maintaining high prices here, if accompanied with a high price of silver or gold, would not prevent our selling British produce and manufactures at low prices on the Continent; because high prices in paper here, would in reality be low prices in a foreign country, with a metallic currency. Thus, if gold be the general medium of exchange among commercial nations, and is worth L.5 with us, it may be sold, without loss, for L.4 on the Continent, producing the same quantity of the common medium of exchange. Sir John then follows out this argument, by stating, that the adoption of a high standard for the precious metals, and depending principally on a paper circulation, leads to a protection of our domestic industry—benefits greatly our export trade—and effectually prevents smuggling of silk and other foreign articles; and he concludes with expressing the belief, that other nations would not be under the necessity, were this system adopted, of enacting those "*hostile tariffs*," as a security for their circulation, by which our commerce is undermined, and shorn of the advantages it would otherwise confer on the nation.

In discussing the subject-matter of his treatise, the author proceeds, in the first place, to consider the nature and advantages of a metallic currency, then those of a paper circulation;

and concludes with explaining the principles of a system, by which the advantages of both, without the disadvantages of either, may be obtained. In short, Sir John thought it incontestibly proved, that it is possible for a rich country to afford high prices for its agricultural and other productions, to give high wages to workmen, and to pay high taxes to government; in short, to be a great and prosperous nation by having a paper currency convertible into the precious metals at a high standard, and without the risk of suffering any loss in its commercial transactions with other nations, or being liable to hostile tariffs.

We had expected to have brought this Memoir of Sir John Sinclair to a conclusion in this number, but even in the very general survey of his life and labours that we have necessarily taken, we find it impossible to do so without extending the present section to a disproportionate length; we must therefore reserve the remainder of our facts and observations till the publication of our next. To those who have followed us thus far with some degree of interest in the history of this great and good man, it will be gratifying to learn, that a life of Sir John, on a scale adequate to its merits, is now in the course of preparation, by his son, the Rev. John Sinclair, A. M. Oxon., F.R. S. E., in which a variety of letters, to and from many of the most distinguished characters of the last half century, will be necessarily included. The work cannot fail, especially in such hands, to prove one of great interest and importance.

(To be concluded in next Number.)

ON THE WINTER MANAGEMENT OF POTATOES.

By Mr TOWERS, Author of the Domestic Gardener's Manual.

A GREAT deal has been written upon the failure of potato crops, and many contradictory opinions have been hazarded. The fact appears simply to be this: if failure from disease have taken place, the evil has been local, or nearly so, from a species of *endemic*, whose ravages were confined to certain districts, and dependent upon causes not in general operation. I have never witnessed such a failure; nor have I seen, nor corresponded with, any person who has traced its effects; but one solitary instance of a total loss of a variety occurred to me in 1835, under circumstances so extraordinary, that I think it desirable to describe them before I enter upon the consideration of the chief subject of this article.

In 1834 I received from a friend three or four potatoes, which were said to be well adapted to garden culture, but not very suitable to the field. The skin was almost black, in some parts approaching to a deep mulberry tint; the form very good, round and perfect; the tuber was tolerably well supplied with eyes, but the size of it was rather small. The potato, when boiled, was good flavoured, mealy, and its colour almost white. The four potatoes yielded a crop sufficient to plant one entire row, about seven yards long, the tubers being uncut, and placed six inches apart. The soil of the plot (it was in a garden) was a sandy loam, strong, and naturally binding, which texture, my experience teaches me, is always found whenever a very large proportion of coarsish, gravelly sand exists in a soil that contains more chalk than alumen (the matter of clay). The purest and most unctuous loams appear, by my analysis, to abound with fine soft sand (siliceous earth), and but little coarse gravelly matter. However, the loam I employed, which had been trenched some years ago to the depth of twenty inches, and manured in routine sufficiently for most crops, was exceedingly suitable to the potato, and was planted with three early varieties of that vegetable, to the right and left of the row which contained the black tubers alluded to. The rows were formed about one

yard asunder, and thus every variety may be said to have been planted in the same soil, and subjected to the same treatment.

The plot was planted very early in the season; and this leads me to remark, that no advantage appears to be derived from such a practice, for the tubers remained long inert, and did not vegetate till the usual period, when the sun acquired power, and produced that degree of moist temperature which the potato requires; in fact, I found that those tubers which were put into the ground late in March, or early in April, were excited equally soon as others which were set in February.

All the varieties, however, rose with equally apparent strength and vigour; and the blacks produced as perfect and well developed a row of shoots as any of their competitors; and these continued to thrive till they attained the height of five or six inches, then a change of colour became manifest, and the leaves, instead of retaining the dark healthy hue natural to the variety, assumed that of a sickly yellow: growth ceased, the plants stood still, and, though they appeared to live during two months, dwindled gradually, and at length died away, and vanished. In the mean time, every ordinary care was employed to excite vegetation; the ground was lightly digged, hoed, kept clean; and a portion of light earth brought up to and about the stems: but all was to no purpose. The other early varieties progressed luxuriantly, and yielded fine and healthy potatoes, during July and August. When, however, the ground occupied by the diseased roots was examined at the period of the final digging, *not a single vestige* of a potato could be traced—all had vanished; and thus the destruction was found to have been complete. The phenomenon—for such I regard it—appears inexplicable; I do not perceive a cause whereby to account for it; it is involved in mystery; for although the drought of summer produced the effect of diminishing the yield of *all the late crops*, I had not in any part of my grounds another instance of failure from disease.

If the destruction complained of in the north of England were not caused by a peculiar local agency, it had its origin, I presume, in some improper treatment of the seed-potatoes at the time of digging, or during the succeeding winter. If a potato crop ripen late in October or in November, there exists a great

probability that the tubers will be exposed to some degree of frost; and if, after a fine clear day, when a considerable quantity has been dug up and lies exposed, the thermometer, about sun-set, fall to a degree or two below *thirty-two*—the freezing-point—the skin of the potatoes, being in a moist state, will be covered with frosty rime, and after a very short exposure become decomposed. This accident occurred once to me when I was taking up a valuable seed-stock of several new varieties which I had received from the President of the Horticultural Society, and wished to retain in separate heaps till they could be stored away and properly marked. Three degrees of frost took place before the twilight set in, and though every exertion, consistent with the required attention to sorting, was made to house them, numbers glittered with frosty crustation. In the ensuing season, when we began to plant, I found the cuticle gone or abraded, and the pulp rotten in many places. The eyes of potatoes so decomposed become affected; they are either inert, or protrude poor weakly sprouts, which never succeed in their future growth, and cannot possibly yield healthy tubers. I am certain that numbers of frosted defective sets are planted; and if it so happen that the whole of the seed-stock be more or less affected, it will always be wise economy to plant the potatoes entire; for though three-fourths of the germs may be inert, one or two that are sound may remain; whereas blanks must occur in the rows where cut sets that have diseased eyes shall be employed.

In collecting a large plot of potatoes, the judgment of the farmer must direct him in employing an appropriate method of protection; but as a perfectly dry condition of the skin is the greatest means of security, the roots ought to be placed under cover of an open shed, if possible, till the moisture evaporate; a common sheet let down in front of the opening during a keen night will effectually secure the potatoes, because they cannot be kept too cool, provided they be screened from actual frost.

Heat and moisture are the agents which stimulate vegetation; light is the element of colour and maturity; these are facts now acknowledged by the wisest physiologist, and confirmed by the experience of every day: hence we are taught that preservation of potatoes, designed either for food or future cultivation, must

depend on the absence of these stimulating agents. It appears probable, therefore, that the ordinary practice of "pitting," that is, of burying the store in broad trenches, coated with straw and covered with a ridge of earth, is very far from judicious. The ground is always more or less moist, it is also warm enough to produce some degree of stimulus; and thus, after the ridges have been exposed to the rains of an entire winter, and the earth on every side becomes saturated by water, it is evident that the lining of straw, or other vegetable decomposable matter, will be acted upon, and tend to produce heat. The potatoes therefore push, and it is no uncommon circumstance, at the opening of a pit, to see the whole surface of the potato stock covered with a matting of long white shoots, every one of which has been protruded at the expense of the pulpy nutritive substance of the roots. If pits be employed, it would always be wise to dig them in a dry spot of ground, protected by a covering roof of some kind or other. Water should be excluded, and the roof will also prevent much of the operation of frost; but the greatest security will be obtained by excavating the dry earthen-floor of some barn or out-house, prepared for the express purpose; if the potatoes be laid upon dry ground, a little below the surface level, and covered with a few inches of perfectly dry litter or sand, no frost of ordinary character can injure them. In fact, the potato will support a great degree of cold, as I have amply proved during the last fitfully severe winter. I deposited my seed-store of early kidneys at first in a temperate cellar, but perceiving that the eyes began to break, though the heat was seldom above 45 degrees, I had them removed to and laid on the floor of a barn; before they were properly secured, frost of extreme severity occurred, the mercury descended 15 degrees below the freezing point, and some of the exposed roots were more or less coated with rime. They were then covered with straw and sacks; some also were put into chests with dry hay; but every precaution was employed to prevent the accession of heat. The atmosphere of the barn (which was frequently open during six hours of the day) was on several occasions cooled far below the freezing degree of Fahrenheit, yet when the tubers were examined in March, they were found in so perfect a state that I hesitated not to plant the whole of them; all, however,

were put into the ground entire, and they vegetated with extreme regularity.

We cannot, perhaps, refer to Mr Cobbett as to an unquestionable authority ; but he resided so long in America, that his evidence, when it accords with that of others, must be received as adding force to the facts adduced. Now, he states, that apples frozen as hard as stones by the severe frosts of the climate, receive no injury provided they be subsequently thawed in the dark. An observant gentleman, who was for years a surgeon in the army, and served in Canada and the neighbouring States, assured me that a linen sheet thrown around the fruit, so as completely to cover it, was found effectually to secure it in situations wherein the severity of the frost could not be guarded against by any number of blankets. In France, also, where the winters are extremely keen, but not damp, as those of our islands, apples are placed upon shelves ranging one above the other, in cold barns or other erections, capable of being ventilated at pleasure. A curtain is let down in front of these shelves, so as entirely to screen them and the fruit, and the latter is effectually preserved. Linen or silk is to be preferred to cotton or woollen ; but *how* a fabric so thin in texture can act, is a subject which merits the attentive investigation of the philosopher. I recite the fact on the authority of the gentleman above alluded to, because he witnessed the practice during the march of the British forces through the south and west of France in 1814.

I am unable to speak confidently of the success which would attend a similar method applied to the preservation of potatoes ; *apples* are matured *fruit* ; *potatoes* are a sort of underground receptacles of *systems of life* ; each eye is endowed with the vital principle ; but certain I am, that these eyes have endured, and will support a degree of cold, which is scarcely a degree above the freezing point of Fahrenheit. The great points to be observed, are a degree of cold which shall keep the eyes or buds silent, with entire absence of moisture. In some future paper of my horticultural series, I propose to describe a method of planting which I have adopted with all my early crops of the present year, in order to provide for a due and complete protection from spring frost, and from drought during the succeeding summer ; it has answered my most sanguine expectations to this

ime, but it would be premature to write more confidently till I witness the final result.

Potatoes are so extremely valuable to the farmer, to the cottager, and to the public at large, that it behoves every one who is in any degree taught by experience, to communicate, as far as his abilities may enable him to do so, any mode of culture or of keeping the root during winter, which he has found to increase the *yield*, or to secure the *store* in a sound and healthy condition. Much has been conjectured and written concerning atmosphere, predisposing causes of decay, of depredations by worms or other insects, of diseased seed-stock, and so forth. Each of these causes, and many others, may have operated injuriously in some places, and under certain peculiar circumstances; but to me it appears highly probable, that injury from frost prior to housing, and subsequently the exposure to too great a degree of heat in moist situations, have generally been the proximate causes of the mischief complained of. If the farmer could be prevailed with to change his practice in the field; to carry his crop, in detail, before the hour of sun-set to some dry airy shed or shieling; and, after the potatoes have become perfectly dry, to store them up in a building similar to that employed by the best gardeners in large establishments for the preservation of apples and pears, one which is walled round, and roofed so as effectually to prevent the ingress of actual frost, but latticed for the admission of air and the obstruction of light, he would find his account in the alterations.

I have said enough upon general principles, and any man of acute observation may improve upon them as far as concerns local conveniences; in the mean time, it would gratify me very much could I induce Mr A. Gorrie to take up the subject; he is well acquainted with the climate of Scotland, and is intimately versed in the practical science of gardening, as respects North Britain. No one can peruse his papers without deriving pleasure and instruction from them; and, individually, I have been so flattered by the expression of his kindly feeling, that I am induced to hope he will, at my appeal, come forward to investigate a subject which cannot fail to excite the liveliest interest in the mind of every one who has the welfare of the labouring population at heart; for next in order to the cereal crops, the potato claims the utmost care of the patriotic agriculturist.

AUSTRALIAN COLONIES.

By Mr G. MACKILLOP, Hobart Town.

IN January 1835, I made a visit to New South Wales, and during my voyage to Sydney wrote an account of Van Diemen's Land, which I shall here insert verbatim.

Climate.—In Hobart Town, where I have been residing, the climate is most salubrious. In winter it is like that of Rome: in summer it is more like that of Switzerland, the heat of a situation “sub curru nimium propinqui solis,” being tempered by the breezes from the neighbouring mountain. The only thing to be complained of, is the sudden and extensive falls in the temperature, occasioned by gusts of wind from Mount Wellington in its vicinity, and which induce rheumatism in persons subject to that complaint. On the whole, however, the climate may truly be pronounced excellent, so far as health is concerned.

The districts farthest to the westward which have yet been settled, being high and more exposed to the influence of the prevailing south-west winds, from the frozen ocean, than the rest of the settled country, have been found to be subject to frosts, even in the middle of summer; and hence the great disappointment to the farmers in these quarters, from injury done to their wheat and potato crops by it. Crops, indeed, in high and exposed situations, all over the island, are subject to be attacked by frost; but, as I have said already, those on the west side of it are most particularly so.

You will observe, from what I am about to state, the prospects of sheep farmers in the colony have been improving rapidly in the course of the last five or six years. So late as 1827-8, mutton was often nearly unsaleable, and wool was scarcely ever thought worth the expense of shipment; and the newspapers were filled with advertisements announcing sales of land by the Sheriff. Now things are very different. I paid my butcher in Hobart Town 6½d. per lb. for mutton from April to December last, taking a whole sheep at a time. It is now at 5½d., but will again, it is expected, be over 6d. per lb. during the ensuing winter.

The clip of the present season's wool is in course of shipment, and will amount to two millions of pounds weight. What is sold

here brings 1s. to 1s. 8d. per lb., according to quality ; and what goes home on the grower's account, it is expected, will bring equally remunerating prices. It is all usually shipped to England, the few American ships which sometimes touch here with flour, &c., having as yet exported very little.

Land has also very much increased in value in the last six years. Before 1828, at sales by the Sheriff, it was often sold outright at 6d. per acre, as it is still doing at Swan River. Now good sheep-runs, though not fenced, are worth from 15s. to 20s. per acre ; and some runs have been sold as high as 25s. to 28s., —I mean without fences, or buildings of any description.

It will readily be understood, from what I have said, that most of the colonists, who were large proprietors of land and sheep ten to fifteen years ago, are now men of large property. Many, in short, who came to the colony with only L. 500 to begin, and were frugal at starting, are now worth L. 10,000 to L. 15,000 ; some of them even double the latter amount.

Even at present the prospects for a person wishing to turn his attention to sheep-farming are favourable ; but then he must have capital to begin with, to avoid the high interest given here for money. A farm, for instance, of 3000 acres would cost say L. 3000, and 2000 improved young ewes L. 1600. The annual returns from this stock of L. 4600 would be about L. 400 from wool this time next year, and about 1600 to 1800 lambs, to be dropt in August or September next, would be worth, eighteen months hence, say 1700 at 15s., L. 1275. This is, of course, a very rough estimate, for I have not entered into the detail of the expenses that would be incurred for shepherds, rams, provisions, &c. ; nor have I made any allowances for losses by deaths or thefts. Still it must be evident to any one who has turned his attention to this branch of farming, that, taking the above data for granted, the prospects of profit by sheep-farming in Van Diemen's Land are sufficiently encouraging to satisfy any moderate man.

In some parts of New South Wales land is to be got on much easier terms than in Van Diemen's Land ; that is, it is occupied *ad libitum* in the fine districts, without the bounds of that part of the colonies which is at present liable to be sold, without rent or fee of any kind ; but then, to get to these parts of the colony,

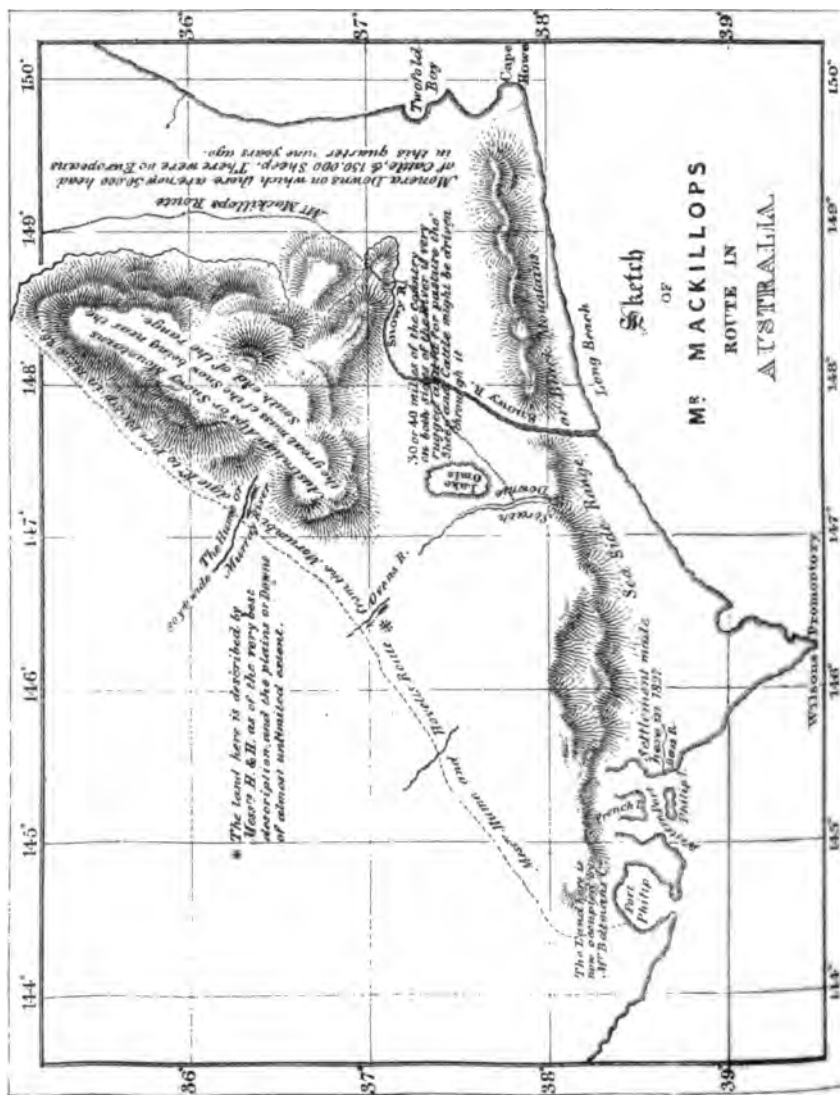
the emigrant must travel 150 or 200 miles into the interior: hence the expense of bringing his wool and fat sheep to market is very considerable; and even where his sheep are brought to Sydney (owing to the immense number of bullocks now in that colony), his mutton is not worth half so much as it would bring in Hobart Town.

I have already adverted to losses by sheep-stealing. In a thickly wooded country like Van Diemen's Land, as large as Ireland, and consisting almost entirely of hills, with valleys of no great dimensions between, and where the free, in proportion to the prisoner population, in the interior is very few indeed, it cannot, I think, be considered extraordinary that both sheep and cattle stealing should be carried on to a very great extent. The depredations are said to be frequently committed with the connivance of convict shepherds; but as free shepherds are now to be had at L. 25 per annum, and as one good one usually takes care of from 700 to 1000 sheep, it appears bad economy in any one to employ a convict in that capacity, unless he should have some particularly good qualities to recommend him. As the free population of the island increases, there will be greater difficulty in transporting and disposing of stolen sheep or cattle, and then, too, the *Rob Roy* gentry will be better looked after than they can be at present.

Grain.—Of this branch of farming I need say little. The population of the island is only about 40,000 souls, and as there is, generally speaking, no market to which wheat can be exported, only enough is produced for the use of the island. The usual price of wheat is 4s. 6d. to 7s. per bushel, but owing to long continued drought during the summer of 1833–34, the crop was very scanty, and wheat was in consequence in Hobart Town and all over the island at 15s. to 20s. per bushel during the last six months of last year. This is the first severe drought the island has experienced since it has been an English colony. It is capable of producing grain for one or two millions of inhabitants instead of forty thousand.

Commerce.—The commercial dealings of Van Diemen's Land, exclusive of its trade with England, are not of great extent.





About thirty boats are engaged during a part of the year fishing for black whales in the bays on the east side of the island. The quantity of oil brought to Hobart Town last year was about 1000 tons, and which has since been shipped to England. Five or six vessels belonging to Hobart Town are usually engaged in sperm-whaling,* ten or fifteen more in trading to New Zealand, Mauritius, Sydney, &c. There were 16,000 chests of tea shipped from Canton for these colonies last year; about 10,000 chests for Sydney, and the rest for Van Diemen's Land. This tea was paid for in Canton, chiefly by bills drawn by the commissaries of these colonies on his Majesty's Treasury, as at present they produce nothing suitable to the China markets. During the same period about 2300 tons of sugar were imported into Van Diemen's Land from Mauritius, besides a small quantity from Calcutta and Java. In return for the sugar from Mauritius, sometimes wheat and Sydney salted beef are sent; but it, as well as the sugar and rum from Calcutta, is chiefly paid for by bills on his Majesty's Treasury, drawn to meet the expenses of the prisoner population in the colonies,—by private bills on London, drawn against consignments of wool and oil sent there,—and by bills on England by immigrants, on letters of credit brought with them from thence.

Banks, Currency, &c.—The profits by sheep-farming having been for the last few years as already described, it has of course been the aim of almost every farmer to embark as much capital in his business as he could readily command; hence ready money has been in great request, and the price often paid for it would, in England, have been reckoned usurious,—15, 20, and even 30 per cent. per annum being often given for it. Ten to twelve per cent. are reckoned rates quite *en conscience*—10 per cent. being the rate at which the Joint Stock Banks discount.

* There are upwards of forty sperm whalers belonging to the port of Sydney. The port of Hobart Town is perhaps as well adapted for this branch of commerce as that of the other colony. The only reasons, therefore, I am aware of for there being so many more whalers there than here are, that salted provisions are generally much cheaper there, and that New South Wales being a much older settlement than this, capital has had time to accumulate there for such purposes; whereas all the little capital we have yet here is fully required for sheep-farming and other local purposes.

Two of these banks have been in existence for the last eight years, and have always divided 14 per cent. per annum, or upwards, on their paid-up capital,—that of the Van Diemen Land Bank being L. 40,000,—that of the Derwent Bank was formerly the same, but is now L. 60,000, beside L. 40,000 in progress of payment. The Commercial Bank was only lately established, with a smaller capital than, I believe, either of the other two; and a branch of another bank, now forming in London for these colonies is also talked of. Its plans have not yet been fully developed to the public; but if, as is reported in the Hobart Town newspapers, the paid-up capital be only L.100,000, for establishments at the Cape of Good Hope, New South Wales, and Van Diemen's Land, and the shares be nearly all in the hands of parties in England, I suspect it will be wanting in local influence and connections. The old banks in Hobart Town have been well managed, have made few bad debts, and afford a fair object of speculation to parties turning their attention to these colonies for an investment of spare funds. Many of the parties connected with them are men of large property, and hence they have a degree of stability and credit they would not possess solely from the amount of their paid-up capital.

As I am now on the subject of money, I may as well say, remittances can best be made by colonists coming from England in specie, as there is some difficulty in negotiating any but Government bills in Hobart Town. Sovereigns have long commanded a premium of 1 per cent. at the banks; and Spanish dollars, as well as those of the North and South American States, are now current at 4s. 4d.; so that, if silver be low in England, these would make a better remittance than sovereigns. There is no premium, however, to be got for them at the banks.

Several immigrants have lately brought from home bank post-bills, drawn by different banks in Ireland and Scotland on their agents in London. In this way the party making the remittance, it is understood, gains a small interest on the funds lodged in the bank, till the bill be paid in London. If this course be resorted to in future, instead of a bank-post bill, a regular set of bills of exchange should be taken, as such would be much more readily negotiated than a single bank-post bill: if the sum to be remitted be large, it would be preferable to have the amount in

sets of £. 100 to £. 300, as small bills of this kind are more in demand.

Many descriptions of goods from England generally pay well in Van Diemen's Land; but unless the emigrant be well acquainted with the wants of the market, and the quantity of supplies that have lately gone to it, it would be dangerous for him to embark in this business, which, in short, requires a minuteness of information not to be found in a rough sketch like this.

Police.—This is a serious matter for the consideration of any one embarking to a penal settlement. Before I left England, I had often seen it stated in books published in Van Diemen's Land, that the police was there so efficient, that both person and property were as safe as at home. Hobart Town contains 10,000 inhabitants, and one has only to attend its police office any morning in the week to be convinced there is ten times more general business done in it, than in the office of any town in England of the same size. In short, I have found, as was to be expected, considering the *materiel* of which our population is composed, petty thefts are numerous, and the annoyances to be met with from the employment of convicts in any way a great bore.

Hobart Town, February 1836.—Since I wrote the foregoing account of Van Diemen's Land, I have seen a considerable portion of the southern provinces of New South Wales, having travelled from Sydney nearly to Westernport, passing through the Cow pastures, Goulburn and Limestone Plains, Monera Downs, and from thence by the south of the Australian Alps or Snowy Mountains to the westward, through a country never before visited by any European.*

* I intended to have sent an account of this new country through which I travelled, and which is roughly sketched in the annexed map, but have not time at present. I shall, therefore, only add a short note to it. Strath Downie is entirely surrounded by hills, but not of any great height. So far as I know, all the country between the Snowy Mountains and the sea-side range, from 147° to 149° E. Long. is rugged, and only very partially fitted for pasture of sheep and cattle, except a small marsh about five miles called Lake Omis, a little to the eastward of the stream, supposed to be commencement of Owen's River; and the country a few miles on both

I was somewhat disappointed by the appearance of the country for a hundred miles to the south of Sydney—the weather being then dry, and little grass or vegetation of any kind to be seen; but Goulburn and Limestone plains, and especially Monera, fully answered my expectations.

Monera is a table-land, probably nearly 3000 feet above the level of the sea, extending from 35° to 37° south, and from the sea to the Snowy Mountains, as shewn in the accompanying rough map. It is entirely without the bounds of that part of the New South Wales colonies, which have yet been advertised by the Sydney Governments for sale. There were no settlers in it in 1827, but when I was there lately it was estimated to contain 50,000 heads of cattle and 150,000 sheep, belonging to gentlemen chiefly residing in Sydney. It consists chiefly of downs, like Salisbury Plains in Wiltshire, is very lightly timbered, well watered, and produces most excellent feed for both sheep and cattle at all seasons of the year. In short, I have not seen finer pasture any where in the colonies than is to be met with generally in Monera. There is one great objection, however, to it as a sheep-run. Being high, and near the Snowy Mountains, heavy falls of snow often occur in it, especially during winter and spring. Those who trust their sheep to superintendants generally lose lambs every year by the snow; but several of the gentlemen I met with, and who were looking after their own concerns, assured

of that stream, where the land is nearly entirely free from timber, and the downs covered with a most luxuriant sward of kangaroo and other grasses. At the source of this stream, I and the gentlemen who were with me ascended to the sea-side range, there consisting of scrubby hills, probably 2500 to 3000 feet above the level of the sea. From the top of it we saw the sea at a distance of twenty-five to thirty-five miles, a low scrubby forest intervening.

The Snowy River was only seen at the three places at which it was crossed. When crossed the last time it was running south. The native who was with us on reaching the stream above referred to, pointed to the south-east as the situation of the mouth of the river, stating that he had been there, and offering to conduct us to it. He observed that the tide flowed for several miles inland; but we could not make out from any thing he said whether or not the river is likely to be navigable. There was a large body of water in it when it was last seen.

No snow was seen after the day on which we crossed the Snowy River the second time, though we were often on the top of high hills, and could see a considerable distance to the northward.

me they had not suffered in this way, though they were following the practice formerly prevalent in this island, of taking lambs from their sheep once in every eight months, and in consequence having them sometimes lambing in the middle of winter.

Another great objection to Monera is its distance from a shipping port. For many months past, the country, for a hundred miles round Sydney, has been suffering from one of the severe droughts which often occur there, as may be seen on reference to Mr Wentworth's account of these colonies, published about 1820. Fodder for bullocks, with drays, is now therefore exceedingly dear, on the road from Monera to Sydney, and in consequence, it costs the sheep-farmer in the former place L. 14 to L. 15 per ton to send his wool to the port of shipment. Indeed, a Monera farmer even here tells me, that many have lately paid carriers as much as L. 16 per ton to have their wool transported to Sydney. It is expected that when the Sydney Government advertise Monera for sale, they will make a road from it to Two-fold Bay, where there is a good harbour. This, however, will be a Herculean undertaking,—for the mountains behind it are from 3000 to 4000 feet high, and so steep in many places in the descent towards the sea, that to make a passable road down from them will require as much skill and labour as were displayed in the formation of the route across the Simplan.

I conclude the few remarks I have made respecting New South Wales with the following brief statement of the comparative advantages and disadvantages of both colonies.

By Mr Wentworth's account of these colonies, already referred to, the weight of a full grown wether in Van Diemen's Land, at the time he wrote, was usually 90 lb. to 100 lb. neat meat. During the two years I have been residing here I have seldom seen one weighing more than about 40 lb.—I infer from this, that in late years the farmers in Van Diemen's Land have been doing all that was in their power to improve the fleeces of their flocks, by crossing them with pure Merino rams—yet their wool is much inferior in quality to that produced in New South Wales, even to the extent, on an average, I imagine, of 4d. to 6d. per lb. In New South Wales the old practice is often followed, especially where there is plenty of grass and room for ch

of runs, of taking lambs from the sheep once in every eight months, nor is the carcase of the produce reduced by this procedure—the wethers often weighing from 60 lb to 70 lb., with fleeces equal, or even much superior to, the best in the island. This practice is not now ever followed here, chiefly, I believe, because Van Diemen's Land is now too fully stocked to admit of the course being followed with advantage.

Sheep-runs are to be got in the Sydney colonies on much easier terms than here, as already explained.

On the other hand, the sheep-farmer here has the following advantages over those at Sydney.

Mutton is seldom here under 5d. per lb., whereas at Sydney it cannot sometimes be sold at 2d.

We have no droughts here like those which frequently occur at Sydney, but which do not extend more than about a hundred miles round the capital.

Lastly, the sheep-farmers here generally have much less expense in bringing theirwool to market than the farmers at Sydney.

On perusing what I wrote a year ago, I do not find I have much to add or alter. The new bank therein referred to has been set agoing with a paid-up capital of L. 200,000, and its operations confined to this and the New South Wales colonies only. Owing to the competition at its starting, the rate of discount at the banks here has been reduced to 8 per cent.; but as the profits by sheep-farming continue as before stated, all the banks will probably soon find they can get as much paper to discount at 10 per cent. as they require, and consequently return to that rate, or some one of the old banks will be brought to a close; for I take it for granted, that if these bankers can make 30 to 40 per cent. by sheep-farming, they will not continue their banking operations at the present low rates of profit, merely for the advantage of the community. At Sydney the new bank has also been set agoing, but all the banks there continue to discount at 10 per cent., though there be twice as much capital there as here.

With reference to the paragraph headed *Banks, Currency, &c.* I beg to say there is not at present any premium to be obtained for gold, and that, therefore, remittances should now be

made in the description of bills mentioned in that paragraph.— They would now sell at par to 1 per cent. premium.

I have often wondered, both before and since I came to these colonies, that capitalists in London, who look to all parts of the world for investments, should not occasionally have turned their attention to lending money on mortgage in these colonies, where 10 to 12 per cent. per annum for five or six years certain (often 15 per cent.) could always have been got in the last ten years, with what I consider the very best security. Parties in Hobart Town, who, having other professions to attend to, cannot enter upon sheep-farming, generally lend their money to the sheep-farmers on mortgage of their landed property, and not in one case in a hundred is there any dispute or difficulty in recovering the amount, when the term of the mortgage expires. There is seldom any difficulty here as to titles, and as mortgages are required to be registered the same as in Scotland, it can be seen at once if there be any incumbrance on the property. The money to be lent need not be paid in England, till a notorial certificate of the execution and registry of the mortgage shall have been sent home from this. When the terms of the mortgage should have expired, in a deed, it would be necessary to invest some one with authority to receive and remit the amount in Government or other safe bills; but there should be no more difficulty in arranging an affair of this kind here than elsewhere. On reference to one of the respectable houses of business in London, connected with these colonies, they would readily name some trust-worthy person to do the needful, or would probably guarantee his faithful management of it for a very small commission, and which could well be afforded, considering the interest that would be gained by the transaction, before this exigency could occur.

Port Phillip.—The attention of all the intelligent part of the community of Van Diemen's Land has been ardently turned to this place during the last six months. Land has become so extravagantly dear here, many who have funds to invest have been looking elsewhere for cheap runs for sheep, and on lately examining the country about Port Phillip, it has been found to be generally of excellent quality. Freight has already

engaged for 30,000 sheep to be sent there, and probably 10,000 more will follow before the winter set in. I have seen many letters and parties from thence,—the description they give of the country is every thing that could be wished. Messrs Hume and Hovell, too, who went there from Yas in 1825–26, in their report of their travels to the Sydney Government, represent the land about Owen's River (see the rough map) to be the very best they had seen any where, and the downs of "almost unlimited extent." Strath Downie, at the termination of my own excursion, contains 60,000* acres of as fine land as I have seen any where in the colonies. The Strath is well watered by a large stream running through the middle of it, and, according to the account of the native who was with me, the climate is bland all the year round.† As, however, there is so much fine land near Port Phillip, it will be some time before the colonists will think of going so far inland. Since I was in Strath Downie, however, cattle have been sent there from Monera, and will, ere long, find their way to Port Phillip, and be of essential service to the new colony, as good milch cows are thrice as dear in this island as in Monera. There a good cow is to be got from L. 3 to L. 4. Here, L. 12 to L. 15, and even L. 20, are sometimes given for one.

Port-Philip is within the bounds of the New South Wales territory, though there is not any one there as yet authorized to act by the Government. As, however, convicts may escape from Yas or Monera, following Messrs Hume and Howell's or any other route, to the new settlement, I think it likely a magistrate will soon be appointed there, even though it should be considered impolitic to sell the land for some time to come. The longer the sale of it is delayed, the more money it is likely to bring, as competition will be augmented by the multitude of *squatters* ‡ who will now resort there from this island.

* This is what I estimate I saw. If I had followed the stream in its course to the NNW., the native guide, who was with me, told me, I would have seen fine land to many times the above extent.

† When he was asked if the cold be ever great in Omis, i. e. Strath Downie, he replied—"When all hills in Monera got on white night-cap (i. e. snow)—in Omis, black fellow not *wantit* blanket."

‡ A colonial term for persons who by sufferance set themselves down with their flocks and herds on government land without paying rent for it.

The best pasture lands in this island being now fully occupied by sheep, cattle have of late years become dear and scarce; and a lucrative trade is now therefore carried on by Dr Imlay, a respectable, intelligent, and enterprising Sydney colonist, by importing fat cattle and sheep from Twofold-Bay. Ships so loaded arrive at Hobart Town every week. Part of the cattle will probably hereafter be imported, *via* Port-Phillip to George Town at the mouth of the Tamar; but this will be a work of time, as, till the parties who may engage in this enterprise have establishments in Strath Downie, or somewhere else between the new settlement and the New South Wales colonies, for raising corn for the use of their stock-drivers, &c., they will not be able to carry their operations into effect. It is surprising that in a tolerably good grazing country like this, with a population so very limited, we have hitherto been dependent on Sidney for butter, cheese, salt provisions, &c.; but so it is. The causes that now make it expensive for the farmers in Monera to send their wool to market prevent the settlers in Bathurst and the other cattle districts from sending their butter, cheese, salt provisions, &c. to Sidney; hence most of these articles are now extravagantly dear here, as will be seen on reference to a list of prices I intend to annex to this communication.

We have had fully an average crop of wheat here; but owing to the drought at Sidney it is now there at 12s., and here at 10s. per bushel. Hay is here at L. 7, and there L. 14, per ton. The expense, in short, of living in these colonies is, for the present, nearly double what it is in England. The common necessities of life are always considerably dearer here than at home. Large supplies of wheat, pork, &c. are expected shortly from England, and which will probably give 100 per cent. clear profit after paying freight and all charges. As, however, prices will fall in October next, when the Sidney new crops will begin to come to market, it would not answer for any one to act on the information contained in this paragraph.

I have little to add to what has already been said on commercial subjects. There were 23,000 chests of tea imported into these colonies during the last year. The merchants at Lan-

ceston have commenced whaling in Portland Bay, on the coast of New Holland, between Port-Phillip and Gulf St Vincent, with great success; and the Americans have at last commenced to ship our wool in considerable quantities, the Corvo having lately sailed from Sidney for the United States with 700 bales.

Lanceston being by far the richest side of this island, is beginning to rival Hobart Town; last year the exports of wool from it were greater than from this place. The north side of the island, too, is by far the best country for grain.

Southern Australian Colonies, at Port-Lincoln.—We have not yet heard that any settlers have arrived there. Land, I observe, is not to be sold under L. 1, or perhaps L. 2, per acre; and I do not therefore think that many will resort to that settlement. When the land around Port-Phillip comes to be sold, it will not bring much over the minimum price of 5s. per acre. There, too, sheep (the only agricultural stock by which money can be made in these colonies) can be brought from Van Diemen's Land * at a freight of 2s. 6d. to 3s. per head and with little risk, the passage not usually occupying more than forty-eight hours. To Port-Lincoln I suspect the freight would be 7s. to 9s. per head, and the risk of loss by death would be ten-fold, as the passage would generally have to be made with a beating wind. In a Sidney newspaper I observe the exports of wool from thence in 1835 are quoted at 3,274,000 lb. In 1834 they were only 2,242,000 lb. What will they amount to five or six years hence? Probably 8,000,000 lbs. or 9,000,000 lbs. ! We cannot expect to go on at the same rate of increase here, because we have not pasture (till the island be much more cleared of timber than it is at present) to support sheep to produce wool to any thing like the quantity last stated.

* Sheep, too, will probably, ere long, be brought to Port-Phillip from the New South Wales colonies. A farmer now here from Toomat, at the north-west corner of Snowy Mountains, has been to see the new settlement, and is so much pleased with it, he has resolved to attempt to drive his sheep from their present station to Port-Phillip, keeping a little to the westward of Messrs Hume and Hovell's route; he has upwards of 200 miles of unfrequented country to pass through, and three large rivers to cross. As, however, he is an enterprising man, I doubt not he will accomplish his object.

Prices Current.

	Present Prices.	Usual Prices.
Wheat, per bushel,	9/ @ 10/	5/ @ 7/
Barley, English,	6/ @ 7/	5/ @ 6/
Cape, or Bigg,	5/	4/6 @ 5/
Oats,	5/ @ 5/6	4/ @ 5/
Flour, 1sts, per cwt.,	26/ @ 28/	18/ @ 20/
2ds,	24/	16/ @ 18/
Potatoes,	6/ @ 8/	6/ @ 8/
Hay, per ton,	L. 6 10/ @ L. 7	L. 5 @ L. 6
Butter, Sidney, per lb.,	1/6 @ 1/8	1/3 @ 1/4
Cheese,	1/2 @ 1/4	6d. @ 7d.
Beef, fresh, Van Diemen's Land, or from Twofold Bay, per lb.	7d. @ 9d.	7d. @ 9d.
Mutton, do. do.	5d. @ 6d.	5d. @ 6d.
Horses, cart, good,	L. 40 @ L. 70	L. 40 @ L. 70
... Riding,	20 @ 60	20 @ 60
Sheep, fine-wooled young ewes,	22/ @ 28/	18/ @ 20/
Milch Cows,	L. 10 @ L. 20	L. 10 @ L. 20

*RATES OF WAGES.**Per day.*

House Carpenters, good hands,	8/
... inferior do.,	6/ @ 7/
Stone Masons and Bricklayers,	6/ @ 8/
Blacksmiths,	7/ @ 8/

These rates have been steady for the last two years.

Shepherds, good hands, L. 30 per annum, with food.

... 2d rate, 20 @ 25 ...

Farm labourers, not wanted from the great number of "Time expired" now in the Colony,—wages L. 15 @ L. 20 per annum.

Women, Servants, few good in the Colony, L. 10 @ L. 20 do.

ON THE CAUSES OF FAILURE IN MOSS IMPROVEMENTS.

By Mr ALEXANDER BLACKADDER, Allan Park, Stirling.

My paper on moss improvements having obtained a place in this Journal, it has occurred to me to offer a few remarks regarding the failures which, it is well known, have attended operations of that description, and shall now notice some of those which have occurred in this vicinity.

In 1808, the late David Erskine, Esq. of Cardross requested my advice in the view of improving some very extensive mosses.

I inspected Moss-Flanders, and he mentioned that the portion called Park Moss, on the south side of the Forth, had been under a course of improvement by his father, and had carried crops of potatoes, carrots, oats, and hay. But, at the period of my survey, with the exception of being partially ridged, and more firm under foot, its external aspect differed but little from that of the adjacent mosses, which had not been touched. The heath was tall, and there was a little grass of the coarsest description. On a closer inspection, I observed considerable traces of lime, chiefly under the surface. The system of improvement which had been adopted was the same as that of Swineridge Muir; superficial extent seventeen one-half acres Scotch: drainage 2500 yards: the operations commenced about 1796, but it does not appear how long they were persisted in.

In a recent letter from Mr Erskine, the present proprietor it is stated:—

“ I was abroad during the years my father carried on his improvements, therefore I cannot give you any information from personal knowledge, but I believe he was satisfied with his success, and I have heard that the moss land produced good potatoes and excellent carrots.

“ My ideas on the subject were so different, that on my return to this country after his death, I did not pursue his plan, and the improved moss was covered with a coarse bent grass mixed with heather, which rendered it afterwards more difficult to float away than any other parts of the Park Moss. I have the pleasure to say, that, instead of an unsightly mass of ill cultivated land, raised a number of feet above the level of the carse, I have cleared almost the whole of it, and got a fine extended plain, of rich clay, yielding luxuriant crops. It is all very well improving the surface of moss, where it is upon a gravelly or other inferior soil; but when the subsoil is a fine blue clay, there can be no hesitation, in my opinion, as to the mode of extirpating it.”

I now proceed to another instance. In 1806 or 1807, a person from some of the fen counties of England, requested a long lease of a considerable tract of Mr Erskine's moss, with a design to improve it. But Mr Erskine, after listening to his plans, declined the proposal, saying at the same time, that he should have a lease, on condition of previously shewing, by experiment, that his plans were practicable. On this he set to work upon a very wet portion of moss, draining it by open ditches. He manifestly knew nothing of soils; for, taking up a portion of the mossy substratum on his paddle, and drawing his fingers through it,

"See!" said he to me, "it is as fat as grease!" After two years' operations, this person abruptly disappeared; and the increase of moss plants soon choked up the drains, leaving the moss in a worse situation than he had found it.

Again, in a work on "The Natural and Agricultural History of Peat Moss," published in 1826, by the late Mr A. Steele of Crosswoodhill, there is introduced (p. 192), a report by a committee of the Quarter Sessions of the Justices of Peace for Stirlingshire, appointed to examine the improvements of Mr George Græme of Ardgourie, upon Moss-Flanders, 6th August 1754. The report occupies thirteen folio pages, and is altogether most laudatory. All kinds of corn crops, with potatoes and flax, are mentioned as the products of the improved moss, which had been carefully inspected by the committee in 1753 and 1754, and they say,

"For our parts we are unanimously of opinion, that no soil around it will give better crops of potatoes and flax than this moss will do, when properly dressed, according to Mr Græme's method."—"He shewed us a crop of pease and beans rather stronger and better than any we have seen this season, either in carse or dryfield." They also examined "some of the most understanding farmers in that neighbourhood, who had been present ever since Mr Græme first broke ground in these fields, *upon oath*; and they swore to the following:—

"1. That the moss could be brought to carry good barley, or other grain, with less expense than outfields either of carse or dryfield.

"2. That it can be kept in tillage cheaper than any of these soils, and yield as good grain of all kinds.

"3. That any country man can labour a farm of moss with less than half the stocking necessary for any other farm, and less hazard of failing, and have as good a return.

"4. That when it is properly cultivated, the moss will stand wet and dry seasons better than any soil around it."

The report is silent in regard to the method of culture pursued or manures employed, but allusion is made to "earthing," and the committee recommend the scheme to the Commissioners on the Forfeited Estates, &c.

Being well acquainted with Moss-Flanders, and always residing within ten miles of it, I read the above account with some surprise, never having heard of the improvements to which it relates. Nor was it till after some careful inquiries, that I at last found one person who knew any thing of the matter. After

a long pause of reflection, he exclaimed—" Oh ! it must be Græme's Folly—Græme's Folly!—I know it well—Along-side my own farm—You know the ground as well as I do—It was on Little Ward." And certainly I was well acquainted with the locality, having valued it, in 1818, as worth from 6d. to 2s. 6d. per acre per annum. I understand that Mr Græme continued his operations four or five years, but having expended his funds, he found it necessary to withdraw to America. The moss on which he operated, shelves from 1 foot in thickness to 10 feet, reposing on a rich clay, which was probably the only " earthing" he could conveniently procure; and it may have been by crops raised on the thinner verge of the moss, that the Justices were deceived. A few years ago, this moss became the property of Mr Home Drummond of Blair-Drummond, and having been floated off, the soil is now permanently improved.

In Mr Aiton's treatise on moss improvements, he notices those in Stirlingshire p. 300, (it should have been *Perthshire*) by General Graham Stirling. But it must be understood that much of the moss referred to, had been ameliorated by foreign earthy matter, from incidental flooding. For many years no extension of this attempt at improvement has been effected; and the truth is, that Moss-Flanders, Kincardine Moss, and others in the vale of the Forth, are of a description the most unsuitable for surface improvement. Besides this, putrescent manures are scarce and inconveniently distant; so that one is reduced to employ as top-dressing the subjacent carse clay, for which it is by no means adapted, not being found to forward the decomposition of the moss, without which no permanent fertility can be realized.

The particulars to which I have requested attention may perhaps serve as specimens of the ordinary sources of those false impressions which have very extensively been entertained in regard to moss improvements, and which often emanate from authors imperfectly versed in the science of agriculture, or the writings of mere theorists who are not qualified to distinguish betwixt truth and falsehood.

In the paper above alluded to, I had said that " there is no danger of overdrying moss by ' *draining*.' " And this I still think will generally be found; but I at same time said that there is great danger from over-trenching. Now, I am confident,

from the urbanity of F. B.'s * remarks, that he will take in good part what I am now to reply ; for it is by the accurate scrutiny of facts that we may hope to arrive at the truth.

1. According to his own shewing it is " many years" since his observations were made, and he merely states the results of his impressions at the time, from recollection.

2. He only *rode over* the ground ; in which way no very accurate observation could well be made.

3. He describes the ground as " light and puffy, and the horses' feet sunk deep into it ;" and, that " it was dry weather at the time."

Now, all this is just what might have been expected in a case of *over-cropped* moss land, and more particularly if it had been *over-burned*. Had it merely been *over-dried* by draining, it would have been hard, resembling peat, and the horses' feet would not have sunk deep into it.

Too deep ploughing or trenching may have been the cause of its becoming light and puffy, although it had not been *over-drained*.

In moss cultivation over-burning and over-cropping are often sources of disappointment. It should as soon as possible be laid to grass ; and, when a sward is once obtained, it should not be hastily broken up, but the vegetation kept sweet by top-dressings of earth mixed with lime. I cannot say that I ever saw moss made too dry by drains alone ; but, if it were, I should soon find a very simple remedy by stopping the main drains.

Provided a moss has a tolerably smooth surface, burning should not be employed. Turning it over, and harrowing in, manure, or earth, along with oats, is much the preferable course. By this means the sward will undergo a sufficient degree of decomposition, to prepare it for a potato-crop the ensuing year ; or, on good moss, turnip ; after which the sooner sown down the better. But when the surface is rough by natural scaurs, or by the operations of peat-making, burning becomes requisite. It is, however, much the practice, in these circumstances, to level by the spade, throwing the heights into the hollows, and trenching. The rough heathy cover thus thrown into the hollows,

* See vol. vi. p. 512. of this Journal.

never acquires a suitable degree of compactness. If there is water in the hollows, it will remain, and the coarse upfiling never decomposes. If, again, the pit or hollow is dry, nothing will grow over it, all the moisture being continually obstructed from the superficial parts, on the occurrence of drought.

The true course differs essentially from those now alluded to, and rests upon very obvious principles. After the field has been sufficiently under-drained, in parallel straight lines, let the surface be made uniformly smooth, by paring off the rough herbage, and as much of the moss as may be necessary, sometime reverting the sward-cuttings, and otherwise exposing to the drought. When sufficiently dry and light, let the whole be disposed in the form of rude dykes, say 24 feet asunder, and parallel to, and equi-distant from, the under-drains, and of a convenient height, narrow, and admitting freely the access of air, so as to favour desiccation. In wet seasons, or in view of winter, it may be necessary to cope the whole with a rough heather turf. By next spring, at farthest, the dykes may be set on fire, and will burn freely, producing a quantity of ashes. In very dry seasons, the moss under the dykes will also be consumed. All the ashes, with the stratum of moss immediately under, should next be spread out, to right and left, from the course of the dykes, so as to form water-furrows where the dykes stood. The ashes and loose peat-earth immediately under, being thus laid uniformly upon the surface, a soil will thereby be formed of a sufficient depth for grass-seeds, or for oats; or it may be covered in with a crop of potatoes or turnip, whichever may best suit the state of the soil; but putrescent manure is indispensable if a green crop of any kind is contemplated.

SOME ACCOUNT OF FLEMISH HUSBANDRY.

By ALEXANDER THOMSON, Esq. Banchory House, Aberdeenshire.

I spent a few weeks in the summer of 1835 in Belgium, and I then observed several agricultural practices which were new to me, and which appear worthy of consideration if not of imitation, in our own country.

In various parts of Brabant, I saw, in all the various steps of its progress, a mode of bringing heath and moorland into cultivation, which, on inquiry, I found to have been long practised, and to a very great extent. The ground to be improved, generally not exceeding an acre at one time, and often much less, is planted with one year old seedling oaks, in rows one foot apart, and the same distance from plant to plant in the rows; these make annual shoots of at least twelve or fifteen inches with a proportional side growth. They are allowed to grow up untouched for five or six to eight or ten years, according to the progress they make. The annual fall of leaves enriches the soil, while the thick shade completely extirpates the heath and other wild plants. When the soil is supposed to be sufficiently ameliorated, the young trees are grubbed up, the stems are made into faggots and sold for firewood, and the leaves and small branches are burned on the spot and the ashes carefully spread on the soil, where they act as a very stimulating manure. The ground is then ploughed and sown with a corn crop, generally oats, a regular rotation of cropping ensues, and thus the land is permanently reclaimed.

Those moors which I saw looked very poor and unfertile. The heath was short and stunted, and where the soil was recently turned up, it looked as white as a newly limed field. In short, it seemed little better than pure sand, which, however, had the greasy feel peculiar to alluvial soils, and in some places there was a thin stratum of peat earth above the sand. The lately planted oaks looked exactly like nursery ground, and the older like very thick coppice, so that this mode of improving produces immediate beauty. A few of the trees of the outside rows are sometimes left to grow to timber, but too frequently the oaks are cut out to make room for willows and poplars, which afford a larger quantity of firewood. I could not get any distinct account of the expense of this mode of improvement; but, as firewood is very dear in Belgium, I should expect that the faggots sold would amply repay the price of the seedlings and the expense of planting and grubbing them up. There is no other expense in the process until the plough and sowing, which, of course, ought to be charged against the ensuing crop. I was informed that a large portion of

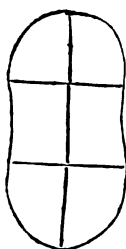
now arable land in Brabant, was in the state of barren moor even within the memory of persons yet alive, and had been reclaimed in the manner now described.

There may be situations in Scotland far removed from supplies of manure where this process would succeed and pay. We all know the effect of larch plantations in extirpating heath and producing good pasture, where little or none existed before.

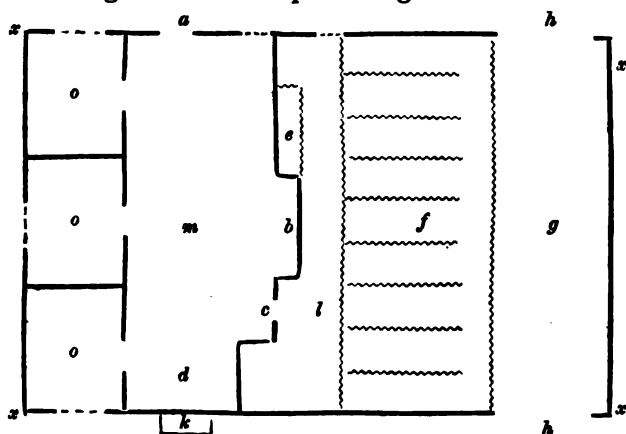
The Belgian farmers are not contented with one good crop in the year; they contrive to have two from a considerable part of their land. Wheat and rye are sown in autumn; in February or March, carrot seeds are sown among the braird, and the best time for doing this is when the ground is covered with snow; when the snow melts the seeds are carried down into the soil, and if there be no snow, the best time is during a heavy fall of rain. The carrots spring and grow under the grain. A wide toothed wooden harrow is drawn over the ground, which slightly stirs the soil and loosens the stubble. The latter is carefully pulled up with the hand and removed from the ground, and the carrots when necessary, are thinned. They grow rapidly after getting the ground to themselves, and produce a large supply of winter food. The objection which naturally occurs to this plan in any country is, that it is too much for the soil to carry two crops at one time; but it must be noticed, that the corn crop draws its nourishment from the upper part of the soil, whilst the carrot roots penetrate much deeper and feed upon a lower stratum.

Turnips are sown after the cutting down of the grain crops, but the harvest is so early in Belgium that the stubble is ploughed in, and the turnip generally sown by the 15th or 20th July. All those I saw were broadcast. After corn they also frequently sow spurry; a plant with us considered utterly unworthy of cultivation, but so much esteemed in Belgium that I found there is a law against exporting the seed.

The collection and preservation of manure is unquestionably the chief excellence of Belgian farming, and the subject on which we may derive most instruction from attending to these practices. When they have the means of procuring distillery refuse or any other liquid manure, they form small tanks for receiving it. These are built of brick, four or six together, thus,



about seven feet deep, and each division from six to ten feet long, and six or seven feet wide; when empty they are neatly whitewashed inside. I do not know why they are not rectangular, but I saw none which were so. All sorts of liquid manures are conveyed from the large towns by the rivers and canals to a considerable distance, and bring a large price. They are bestowed chiefly on the young brairds, or, as it was expressed to me, "the whole spring they are constantly watering their braird with liquid manure, driving carts with barrels across their fields in every direction, and showering it upon their young crops," that is, if they have a sufficient quantity of it, they go over all their corn crops repeatedly with it during spring. The effect of this must be very beneficial, but the farmer must and ought to depend principally on the produce of his own farm-yard for his manure, and it is here that the Belgian system is so admirable. The following sketch of the ordinary mode of arranging a house will assist in understanding their mode of proceeding.



a, House-door. *b*, Large fire place. *c*, Door to Cow-house. *d*, Part of Kitchen devoted to churning, &c. *e*, Tank for distillery grains, this does not always occur. *f*, Stalls for cattle, very slightly divided. *g*, Dungpit. *h h*, Doors of Dungpit, wide enough to admit a cart. *k*, Dogwheel for churning. *l*, Cowhouse. *m*, Large apartment for cooking, eating and working. *ooo*, Sleeping apartments. *xxxx*, Outer walls of house. The barns, stables, &c. are generally detached. The large space over the rooms and under the roof is used for keeping hemp, flax, &c. until they are dressed. The width of the whole may be from 40 to 50 feet.

It will be seen that the dwelling-house and cow-house are contiguous. The kitchen or family room is a very large apartment, one end of it is appropriated to churning, &c., and on the side next the cow-house is a very large fire-place or hearth, in one corner of which will invariably be found a fire and a large boiler over it. This is for preparing the liquid food for the cows, with which they are liberally supplied three times a day. It contains water, chaff, weeds of all sorts, nettles, &c., covered with a little rye, rape, or linseed meal, or mixed with distillery refuse. The butter-milk is also added and given back to the cows, and with so much liquid food they are able to consume a great deal of straw in winter. Turnips and carrots seem to form but a small proportion of their food. In summer they have clover, and spurry in autumn when grown. A door adjoining the fire-place leads to the cow-house, and the liquid food is given in wooden troughs, kept clean and nice. Behind the cattle is the dungpit: this is excavated to the depth of six or eight feet, and is twelve or fourteen wide, into it they cast every sort of stuff; sweepings of roads, parings of ditches or banks, and dry earth. These being completely saturated with urine and mixed with droppings from the cattle, form admirable manure. Not being exposed like an English straw-yard to wind and rain little or nothing is evaporated or lost. When the manure is required it is taken out, and the pit again filled with earth, &c. It is of course not filled up to the level of the stalls, but space is left for the increase of the manure. The cattle are constantly in the house, except an hour or two in the morning in summer, and at noon in autumn, when they go to walk along the lanes. Field pasturing is unknown, and thus almost all the manure is deposited in the house, and even a large proportion of what falls out of doors is gathered up and collected into heaps by children. The quantity of manure thus collected is very great, and owing to the variety of their crops, the dungpits are emptied several times a year.

I think the Highland Society might with propriety offer a premium for experiments on the use of covered dungpits, and I have no doubt that if the practice were once introduced the advantages would soon establish it universally. The Belgian cattle are certainly too much confined to the house, and part of their food seems more calculated to improve the dungpit than

any thing else, and to this I attributed what appeared to me the inferior quality of all the products of the dairy ; but this is a quite different question from the propriety of sheltering the manure, necessarily produced in a farm-yard, from the effects of the weather, whether it be sun or wind or rain.

The dogs in Belgium are obliged to take their share of the farm work, and relieve the dairy-maids from the labour of churning. A wheel is erected outside the house and under a wooden cover, twelve to fourteen feet diameter, with a rim about fifteen inches broad. The dog is placed within the wheel, and moving forward causes the wheel to go round exactly like a tread-mill, except that the dog is placed within and the men outside the wheel. There are wooden teeth outside the wheel, which turn a smaller wheel, which again moves a double crank inside the house, to which the plungers of the churn are attached. There are generally three dogs kept for each churn, and they work each an hour at a time. They are made to go faster or slower by calling to them. At gentlemen's houses they were fat and seemed to like their work well, but at the peasants' houses they were not so comfortable looking. On one occasion a dog who was ordered to work to show me the process displayed the greatest reluctance, but on my noticing it the peasant assured me it was only because he knew it was not his regular time.

The cultivation of flax forms a most important part of Belgian agriculture, but the subject is too extensive to be included in the present communication ; perhaps I may ere long say something about it.

I think the following recipe for the cure of red water is worthy of being made public. I received it from a German friend, and it is the recipe of an old Pomeranian shepherd, who declared it *never* failed. I had it a considerable time in my possession before I had an opportunity of trying it on a cow of my own ; and until I had done so with success, I was unwilling to prescribe it among my neighbours lest it should prove fatal. It however cured a cow of mine, and I have since given it in above twenty cases, almost all among my own tenants, and with perfect success, except in two cases, when the animals were at the point of death before they got it. It is a mixture of equal parts of Oleum Philosophorum, Oleum Aspic, Oleum T

binthum; sixty to seventy drops in half a quart of lukewarm water for a middle-sized cow, and from thirty to fifty for a calf according to size. If it does not cure in twelve hours repeat the doze. I have never known more than two dozes required. The materials can be furnished by Baildon, successor to Butler & Co. 74 Prince's Street, Edinburgh.

ON THE CULTURE OF BRANK OR BUCK-WHEAT.

By Mr MAIN, Chelsea.

NOTWITHSTANDING this plant is probably a native of China and other warm climates, it may be cultivated in all the northern countries of Asia and Europe. This is owing to its being an annual of very quick growth, requiring only a summer of two or three months to bring it to perfection. It even ripens in the short summers of Siberia, and is considered exceedingly valuable on *poor light soils*, where the other more valuable cereals do not prosper.

In the north of Europe it is much used as an article of human diet, as well as food for all kinds of live-stock. It yields a flour of remarkable whiteness, and, on the Continent, is very commonly mixed with that of rye or wheat, by both public and private bakers. In England it is sometimes used by bakers and confectioners in the manufacture of their finest fancy articles; but never in common bread or other food. It has been malted and tried in the manufacture of beer, but the liquor, though palatable, is *dangerously* heady and unwholesome.

Vast quantities of this grain are annually imported into this country from Holland and other northern countries, for the use of the gin distilleries; and who also buy all they can get of British growth, which not being kiln-dried, as most of the Dutch grain is found to be, is more valued.

It is a good deal cultivated in some of the poorest gravelly districts in the south of England, but only on *fallows* intended for wheat. In such light sandy or gravelly countries, the fallow-fields are thoroughly worked and cleaned by the first of June: they are then drawn out into ridges, ploughed and immediately sown. If convenient, the dung intended for the fal-

low is carted on, and spread and ploughed in, before the brank is sown ; or this work may be deferred till the crop is carried in in the autumn, just as it may suit the business of the farm.

A bushel of seed is enough for an acre, and if laid on regularly, when the ground is loose and warm, the plants soon make their appearance, and grow with great rapidity ; so that the ground is soon covered and shaded by a dense mass of foliage. It begins flowering in July, and is generally fit to mow about the beginning of October. It is usually cut with scythe and cradle ; and this implement in the hands of an expert workman is astonishingly expeditious. A good hand will cut down four or five acres per day with apparent ease. The scythe is *put out* for the purpose ; and though nothing is cut easier than the green succulent stems, the scythe requires to be swung by a tall and strong man.

The crop is delivered from the scythe in swathes, as regularly as if laid by hand ; and if the weather be fine, it quickly withers, and becomes fit to be carried to the rick-yard or barn. If put together a little green or damp does not much signify ; for though ever so mouldy, the grain is never damaged, and the more mouldy it is the easier it is thrashed. It is the easiest of all barn-work for the thrasher ; as the slightest blow separates the grain from the straw ; and as the latter shrinks into very small bulk, is never bound, and only fit for litter, it is soon out of the hand of the thrasher.

Three or four quarters per acre is a fair crop ; its price generally ranges with that of barley, though, when much wanted by the distillers, double the price of barley is freely given. It has been proved a thousand times over, that the crop of wheat after brank is always better than if the fallow had been kept naked all summer, and whether the ground be dunged before or after the brank. This crop not only shades the ground, and smothers every weed, but leaves the soil in a fine mellow state. In wet summers, when the fallow cannot be cleaned early enough for a crop to be housed, a *cast* of seed is sown in August, to be ploughed in as a dress for wheat ; but it is a very unsubstantial and fugitive kind of manure.

The uses of brank to an English farmer are but few. Ho should never touch it, because it heats and fills them full

bad humours. Neither is it good for fattening any kind of animal except pigeons and poultry; and it is the favourite food of pheasants, whether wild or tame. When given to store-pigs, it should only be in the proportion of one-third to two of any other kind of corn; that being the greatest quantity that can be given with safety. If pigs be allowed to range the brank stubble, they are very soon seized with delirium, and a violent kind of madness, running, into water, rolling in mud, and crying in the utmost distress; and if allowed to repeat their visit to that stubble, fall away in condition most rapidly.

From it being so much and so constantly used in Russia and other parts of the Continent, even as bread-corn, without hurtful effects, we must suppose that its deleterious qualities are dissipated by the oven, or in the process of cooking. But of the effects of brank grown in England, as stated above, I have been witness to repeatedly; and every farmer in those districts where it is commonly raised, is equally aware of its hurtful effects if incautiously used.

Still it is a useful crop for shading poor thin land, if it can be sown after the fallow is perfectly cleaned, and be got off in time to sow wheat. A buck-wheat farmer is, however, always considered an unfortunate man; because the cultivation of it shows the poverty of his land, and there are very few prosperous farmers upon land naturally poor.

But this is assuming that all gravelly or sandy soils are sterile, which is not universally the case. I have seen much very productive sandy soils in the county of Bedford in England, and in the neighbourhood of Musselburgh in Scotland. On such land brank may be raised successfully, especially in favourable summers; and even if the crop of grain be scanty, its service in keeping the ground shaded, and free from weeds, will benefit the succeeding crop, whatever it may be. I may also mention, that there is another crop raised by farmers on such soils, with the same view as that of sowing brank, namely, sowing trefoil or yellow clover thickly on the fallow, as soon as it is completely cut. This rises and becomes a very close sward before the beginning of September, at which time it is begun to be broken off by sheep, leaving the staple in a clean and rich order for the reception of the wheat seed.

I know not whether brank has ever been tried on the north side of the Tweed, or even to the northward of the Trent ; but succeeding in much more northern latitudes, it certainly may have a chance even in the colder parts of Britain. But it must be considered, that a continental summer, though shorter, is much more uniformly warm than in any island, though farther to the southward. It is the *changeableness* of the British climate, much more than its want of temperature, that is so fatal to tropical vegetables ; and as brank is as tender as a kidney-bean, a night-frost in the end of September, or early in October, would destroy a principal part of the crop. After the grain is set, however, no degree of frost can damage it. I have often cut and carried a good crop after every leaf has been killed by frost.

The flowers are sweet-scented, and yield much honey, and consequently are much visited by bees ; but the value of the honey is deteriorated, as it is much darker coloured, and said to be inferior to that collected from heath and other wild flowers.

Whether brank will ever be an object of cultivation to light land farmers in general, is questionable ; but from the present posture of agricultural affairs, many things will be introduced into our present systems, and many expedients had recourse to, to increase, if possible, the produce of the land, which have never before been thought of. Raw materials for the manufacturer, qualities for the dyer and druggist, and even that luxury tobacco, may come in for a share of that labour and care which has been heretofore wholly bestowed on raising the necessities of life for man. Steam-power, as applied to the transit of farm products, as corn and fatted stock, and to that of lime and other dressings, is working, and will continue to work, important changes in the old routine of agriculture. Local advantages will be moderated, and local disabilities will be henceforth assisted in a way that but few are now aware of.

ON HEDGE-BIRDS WHICH ARE ALLEGED TO BE MORE OR LESS
DESTRUCTIVE TO FIELD AND GARDEN CROPS.—NO. II.

(Continued from p. 54).

II. PARTIALLY DESTRUCTIVE HEDGE-BIRDS.

It may not be inconvenient to begin this division as the preceding, with some of the smaller birds which do partial injury in gardens and orchards.

1. *Fructivorous Birds which also feed on Insects.*—The first of these birds which I shall notice is the blackcap (*Sylvia atricapilla*, Latham), the finest songster perhaps next to the nightingale which visits us in summer. It must not be confounded with the black bonnet (*Emberiza schaniensis*), as it sometimes is by young naturalists, for though the latter has a black head, its unmusical *chink, chink, chirp*, only heard in marshy places, has nothing in common with the clear melodious song of the blackcap, uttered too while “in shade and covert hid” in some thick hedge or copse, since the blackcap more rarely allows himself to be seen than the blackbonnet conceals himself. Very little discrimination indeed is required to distinguish the two birds, and but for similarity of name, and trusting to book descriptions without field observation, they would never have been confounded.

Dr Bechstein is somewhat mistaken when he states the food of the blackcap to be insects, and their grubs and berries or fruits only from necessity; whereas I am perfectly certain, from the numbers which I have kept both in the aviary and the cage, that berries are the staple food, while insects are only eaten occasionally. When it arrives from its winter quarters in April, as there are then no garden berries to be had, the blackcap lives more upon insects than afterwards, but even at this season it can generally find in the hedges a meal of privet berries mellowed by the frost, or when these are not to be had, of the larger and harder berries of the ivy just beginning to ripen. Even the first brood of young are more or less fed with these berries, if hatched before the currants are ripe, for though insects are given to the young, they never constitute the whole food when berries can be procured. I have had good opportunities of observing this in the instance of old blackcaps caught and made to feed their young in cages; and more particularly in the instance of a nest of young blackcaps which were placed in a cage hung outside of my parlour window. These were fed chiefly by the male, the female rarely making her appearance, and the chief food which was brought consisted of red currants with occasionally a moth or a caterpillar.

The blackcap, therefore, must rank as a bird partially destructive in gardens to the smaller fruit, excluding, however, cherries and strawberries, which all my caged blackcaps refused. The extent of such depredations, however, cannot be very great, for though the bird is a voracious feeder, and will eat nearly its own weight in the course of the day, the species is seldom numerous, and rarely more than a pair will resort to a garden. Those who admire

its sweet and melodious song, will not perhaps grudge it a small pittance of fruit, even though it do not clear off so many insects as some other partially destructive birds. "It seems," says Mr Knapp, "to live entirely by choice on fruits; and as soon as the brood can remove, it visits our gardens, feeding with delight and almost insatiable appetite on the currant and raspberry; and so much is it engaged when at this banquet, that it suffers itself to be looked at, and forgets for the moment its usual timidity; but its natural shyness never leaves it entirely; and though it remains in our gardens or orchards as long as any of its favourite fruits continue, it avoids observation as much as possible, and hides itself in the foliage from all familiarity or confidence."

The bird which most resembles the blackcap is the babillard (*Curruca garula*, Brisson), a bird often confounded even by good naturalists with the whitethroat, though it differs in size, in form, in colour, in manners, in habits, and in song, all which differences render it improper to call it, as is usual in books, the lesser whitethroat. Its throat, no doubt, is white, but so is that of the blackcap; but it has not the rufous brown on the upper parts of the body which marks the common whitethroat, instead of which it is bluish-grey, while its legs are lead-coloured, and not yellowish like those of the whitethroat. It chiefly haunts gardens, orchards, and hedge-rows, where there are high elm trees, in the higher branches of which it delights to skip about and flit from tree to tree; but it never, like the whitethroat, sings on the wing. This is evidently the bird which White of Selborne accuses of bringing its young into gardens and orchards, and making great havoc among the summer fruits; and which Mr Knapp takes for the female of the common whitethroat, describing it as of an elegant and slender form, with a snowy throat and silvery stomach. White is correct, however, when he says, "It is restless and active, and hops from bough to bough, examining every part for food; it also runs up the stems of the crown-imperials, and, putting its head into the bells of those flowers, sips the liquor which stands in the nectarium of each petal: sometimes it feeds on the ground like the hedge-sparrow, by hopping about on grass plats and mown walks." But though the babillard is a fruit-eating bird, and lives more in gardens and orchards than the blackcap, it does not occasion so much damage as it, not being so voracious and being less nice in its tastes, for it will eat cherries, gooseberries, and I believe strawberries, none of which the blackcap touches. It is also much fonder of insects than the blackcap. From being confounded both with the whitethroat and with the blackcap by indiscriminate observers, this is a much commoner bird than in books it is usually represented to be.

The fauvette (*Sylvia hortensis*, Latham), sometimes called the pettychaps and the garden-warbler, is larger and darker coloured than the babillard, and is perhaps the least common of all the small fruit-eating birds, seldom more than half a dozen pairs being observed in a district where there may be as many scores of babillards and blackcaps. This species, though it is never numerous, exceeds all the small birds with which I am acquainted in voracity, attacking and swallowing large insects, such as full grown cabbage caterpillars and garden spiders as large as a small gooseberry; for small as its bill and throat appear to be, it will contrive to swallow a pretty large grape without breaking the skin, a feat which the blackcap sometimes attempts, but seldom

with success. The largest of these morsels, however, though several in number, do not satiate the craving stomach of the fauvette, which is as eager to pounce on a cherry or a gooseberry as if no spiders nor caterpillars had been previously devoured. This insatiable appetite, of course, places the fauvette high in the ranks of birds partially destructive, though it compensates well for its attacks on the smaller fruits by devouring so many caterpillars, such as those of the cabbage butterfly (*Pontia brassicae*), which almost no other bird will touch. Its song also will, to the admirer of bird music, be more than a compensation for the fruit it devours, the notes being various and rich in plaintive melody, and though not so clear and sweet as those of the blackcap, are very superior to those of the whitethroat or any other small bird, excepting only the unrivalled nightingale.

"The end of our summer months," says Mr Knapp, "and the autumnal season, afford us frequently the best periods for observing some of our occasional visiting birds. Upon their first arrival, and for a time afterwards, their notes announce their presence; but they are not always to be seen with satisfaction, and scattered in retired places, or occupied in the business of incubation, when they are particularly wary and suspicious, they are but casually noticed; but in the times above stated, our gardens, shrubberies, and orchards become their resort, seeking for the fruits usually produced in those places. And first the pettychaps [*fauvette*] with all her matured brood, is certain to be found, feeding voraciously upon our cultivated berries, or mining a hole in the fig or jargonel pear; and so intent are they upon this occupation, that they will permit a reasonable examination of their form and actions, but at other periods it is difficult to approach them."

The whitethroat (*Sylvia cinerea*, Latham), comes next to be considered, and is well known under a multiplicity of provincial names, such as muff, whurr, wheetle-why bird, muggy cut-throat, Peggy nettle-creeper, and the like. It is readily distinguished from the babillard by its yellow legs, the clear rusty brown of the back and upper parts of the body, and from other small birds by the feathers being very full and bulging out around the throat. It is also well known by its merry song, frequently sung while mounting in the air like the titlark, or flitting from one hedge to another. The whitethroat is chiefly found about hedge-rows and lanes where low bushes, brambles, and nettles abound, among which it finds insects to feed upon, and convenient spots in which to build its slight but neatly woven nest of grass, straws, and hair.

In the early part of the summer, when the whitethroats arrive, they do not, like the blackcap, seek for privet-berries, but seem to subsist wholly on the insect food which they find in the hedges, and, by searching for grubs and caterpillars, prevent much of the deformity that hedges are subject to, when their leaves are devoured and webbed over, as they so frequently are, by the small hawthorn ermine (*Yponomeuta oryctanthella*) and other caterpillars. The whitethroats, according to White, are shy and wild in breeding-time, avoiding neighbourhoods, and haunting lowly lanes and commons, but in July and August they bring their brood into gardens and orchards, and make great havoc among the summer fruit. Mr Knapp says that at the end of the summer months, the whitethroats leave the hedges and all their insect food which

for months had been their only supply; and in the thick covert of the gooseberry extract with great dexterity the pulp of the fruit, or strip the currant of its berries. "All these fruit-eating birds," he adds, "seem to have a very discriminating taste and a decided preference for the richest sorts—the sweetest variety of the gooseberry or the currant always being selected, and when they are consumed, less saccharine dainties are submitted to; but the hedge blackberry of the season our little foreign connoisseurs disdain to feed on, leaving it for the humbler appetized natives—they are away to sunnier regions and more grateful food."

There can be little doubt, however, that both these observers too hastily ascribed to the whitethroat the depredations committed by some of the three preceding species, for the whitethroat is by no means a frequent visitor in gardens, and though it does occasionally devour a few currants, and will even taste a ripe jargonel pear, it will not touch a cherry, and I doubt whether it ever attacks gooseberries. It is also accused by some of eating peas, but as erroneously, I believe, as the hay-bird has been similarly stigmatized. It is destructive, there can be little question, but it is only partially destructive.

The birds which come next to be noticed are more destructive than the preceding species, inasmuch as they are considerably larger in size, and consequently require a much greater quantity of food. They are not, however, very numerous in most districts, and they do not always come into gardens—we refer to the thrushes, blackbirds, and starlings, most of which are very well known.

The missel-thrush (*Turdus viscivorus*) is more plentiful in the south than in the north, and is distinguished by being larger than the song-thrush, measuring about eleven inches, but in other respects much resembling it. The song, however, is very different, being more like the blackbird's notes not whistled, but loud, harsh, and monotonous, though as in all species of song-birds there are individuals which greatly excel the rest of the species in tone and variety of notes, and in the spring of 1833 I heard one at Streatham, in Surrey, little inferior to a good blackbird. The nest is also more like that of the blackbird than of the song-thrush. The missel-thrush, though bold enough to give battle to the carrion-crow, and even, by the high testimony of M. Le Vaillant, to attack the eagle, is rather wild and shy; yet in consequence of being better able to procure its favourite food in gardens and orchards, it does not build in such wild and solitary places as its habits would indicate, while on the Continent it prefers forests of beech and fir. Mr Knapp's account of its habits is different and somewhat inconsistent. He tells us, that it "is a wild and wary bird, keeping generally in open fields and commons, heaths and unfrequented places, feeding upon worms and insects. In severe weather it approaches our plantations and shrubberies to feed on the berry of the missel-toe, the ivy, or the scarlet fruit of the holly or the yew; and should the redwing or the fieldfare presume to partake of these with it, we are sure to hear its voice in clattering and contention with the intruders, until it drives them from the place, though it watches and attends notwithstanding to its own safety. In April it begins to prepare its nest. This is large and so openly placed, as would, if built in the copse, infallibly expose it to the plunder of

the magpie and the crow, which at this season prey upon the eggs of every nest they can find. To avoid this evil, it resorts to our gardens and our orchards, seeking protection from man, near whose haunts those rapacious plunderers are careful of approaching; yet they will at times attempt to seize upon its eggs even there, when the thrush attacks them and drives them away with a hawk-like fury; and the noisy warfare of the contending parties occasionally draws our attention to them. The call of the young birds to their parents for food is unusually disagreeable, and reminds us of the croak of a frog. The brood being reared, it becomes again a shy and wild creature, abandons our homesteads, and returns to its solitudes and heaths."

Now, even, were all this correct to the letter—as our northern readers may at once perceive it is not, at least with reference to the magpies being careful of approaching the haunts of man—it would mark the misselthrush as a plunderer, for it rears its second brood, at least during the cherry season, and then commits considerable depredations on this fruit. White is wrong in saying it does not eat fruit. It must not be forgotten, however, that it does some service for the damage it occasions, by destroying, while it rears its first brood, great numbers of caterpillars and grubs. Besides, as is well remarked by White, from its bold, fierce, and pugnacious habits, driving every jay, pigeon, and similar birds from the gardens near its nest, it protects, while it is rearing its first brood, the newly sown peas and other seeds from being devoured.

The song-thrush (*Turdus musicus*) or *mavis*, is next to the nightingale, the finest songster among European birds, and is, withal, a plentiful species, residing with us during the whole year, though, on the Continent, it migrates in winter in large flocks, while here it is solitary, and never congregates like the starling or the fieldfare. It so much resembles the missel-thrush in colour, that Brisson terms it the small missel-thrush, it being about two inches shorter, and weighing about an ounce less. The nest differs, in being plastered inside with clay, rendered firmer by small pieces of rotten wood apparently cemented by the saliva of the bird,* no similar masonry being used to lime the nest of any British bird except the magpie; for, though the missel-thrush, the blackbird, and the crow, plaster their nests with clay, they line with softer materials, while the window and the chimney-swallows line with loose feathers, confining their masonry to the exterior.

The song-thrush is a voracious fruit-eating bird, and on the Continent is termed the vine-thrush, from its extensive depredations in the vineyards, the proprietors of which, however, make reprisals, by killing the species in great numbers for the table, when rendered fat by feeding on the grapes; but in Britain, we rarely kill any small birds for the table, with the exception of larks. In this country, the song-thrush is too wild and wary to approach house walls where grapes are chiefly grown out of doors; but should there be any on the garden walls at a distance from houses, it will plunder them without mercy. I am not sure whether it eats any other wall fruit except cherries, and wherever it finds these, it does not spare them. Two or three pairs of thrushes and their offspring, a number by no means uncommon in the vicinity of most orchards, may thus do considerable damage. Amongst currants and gooseberries, it also makes much havoc; and it probably, also, devours strawberries and raspberries, though, as to this, I cannot speak positively.

* See Rennie's Architecture of Birds for details of the nest-building.

Were it not that the song-thrush renders the gardener important services, it would therefore merit rather to be placed in the next division, than among birds only partially destructive.

Few or no small birds eat the shellless-snails or slugs besides the whin-chat, and, perhaps, the wheat-ear; but the shell-snails are greedily devoured by the song-thrush, which thus becomes a very useful creature. The most common of the larger shell-snails are, the smooth one (*Helix hortensis*) which is either yellowish or variously branded, and the rough grey one (*Helix aspersa*) as big as a walnut. Both of these are very destructive, particularly the last, which lurks behind posts, palings, wall trees, and copings, where it can be screened from the sun, and as soon as the sun sets, or even in a dark rainy day, crawls from its hiding place to devour the young leaves of lettuce, cabbage, or other green crops. In a small garden, this species may be nearly extirpated by hand, but in a large walled garden there are so many spots behind the trees for the snails to lodge, that they can never be kept wholly under, and would be greatly more troublesome, were it not for the song-thrush. In the grey of the morning, when it is yet too dark for the gardener's eye to see the coarse grey snail crawling to its lair, it being more like a small clod of earth than an animal, the song-thrush is already awake, and inspecting every inch of the ground along the garden wall to intercept the devourer, and devour him in turn. The younger grey shelled-snails have their shells thin enough to be easily broken; but in some of the older ones the shells are too hard to be thus broken. In this case, the bird carries the shell to the nearest stone, on which it beats it, till it shivers the shell to pieces, and exposes the now helpless inmate to his merciless enemy. Not contented with the plentiful breakfast thus obtained at dawn, when the snails are moving homewards, the thrush continues to persecute them during the day, hunting them out and dragging them from their concealment. "Very many of them," says Mr Knapp, "does he dialodge in the course of the day. When the female is sitting, the male bird seems to be particularly assiduous in searching them out, and, I believe, he feeds his mate during that period, having frequently seen him flying to the nest with food, long before the eggs were hatched; after this time the united labours of the pair destroy numbers of these injurious creatures."

The same author's account of the winter proceedings of the song-thrush are equally correct and interesting. "The song-thrush," he says, "at this season, passes a great portion of its time at the bottom of ditches, seeking for the smaller species of snails, which it draws out from the old stumps of the fence with unwearied perseverance, dashing their shells to pieces on a stone; and we frequently see it escaping from the hedge bank with its prize, which no little intimidation induces it to relinquish. The larger kind (*H. aspersa*) at this season, are beyond its power readily to obtain: for, as the cold weather advances, they congregate behind some old tree, or against a sheltered wall, fixing the openings of their shells against each other, or on the substance beneath, and adhering so firmly in a mass, that the thrush cannot, by any means, draw them wholly or singly from their asylum. In the warmer portion of the year they rest separate, and adhere but slightly; and should the summer be a dry one, the bird makes ample amends for the disappointment in winter,

intrudes its bill under the margin of the opening, detaches them from their hold, and destroys them in great numbers. In the summers of 1825 and 1826, both hot and dry ones, necessity rendered the thrush unusually assiduous in its pursuits, and every large stone in the lane, or under the old hedge, was strewed with the fragments of its banquet."

The blackbird is by no means so plentiful a species as the song-thrush, but where it is found is equally destructive to orchards and garden-fruit, while it does not make the same compensation for what it devours, as it does not feed on snails like the thrush, though it, perhaps, eats more grubs and caterpillars. The same remarks apply to the ring-blackbird (*Merula torquata*) termed in some parts of Scotland a *stirling*, probably by mistaking it for a starling. This bird, which does not breed in the south, and only passes through in autumn and spring, makes its nest in wild mountainous parts in the north, and cannot therefore prove destructive, except to the garden-fruits about moorland farm-houses; and even these its shy, timid habits prevent it from approaching, except when pressed by hunger. It is so weak, as Dr Bechstein well remarks, "that though larger than the common blackbird, it dare not give battle to a red-breast."

The red-wing and the field-fare, which rank amongst the thrushes, do no damage in this country, in consequence of their only wintering here, and going farther north to breed; for, though I have seen flocks of them in the south of England as late as the end of May, this is too early for any fruits being ready.

The starling (*Sturnus vulgaris*), though a bird very different in appearance, as well as in habits, from the song-thrush, is very similar to it in both the good and bad qualities now under consideration. It feeds equally on grubs, caterpillars, and snails, and is no less tempted by cherries and similar fruit, though it is considerably more timid and shy than the song-thrush, and on this account, the old birds, at least, do not so readily venture into the gardens near houses, though the young, which are of a brown colour, do, and are then mistaken for a non-existent species, termed the brown starling, and sometimes the solitary thrush. The real solitary thrush (*Turdus solitarius*) is not a native of England, being rarely seen farther north in Europe than Burgundy, and is distinguished by the sides of the head being of a bluish colour like the rock-thrush. Ray calls the blue thrush (*T. Cyanus*) the solitary thrush.

ON THE PREVENTION AND CURE OF ROT IN SHEEP.

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WHEN I reflect upon the unsatisfactory character of the opinions which prevail throughout Britain concerning the rot in sheep, I am induced to believe that the subject requires further discussion. The vague conjectures concerning the origin of

flukes in the liver of sheep, which I know prevail in Oxon and Bucks, and I presume throughout England, prevail also I infer from the tenor of your correspondents' observations upon the subject, throughout Scotland. In England, the stock-owners, shepherds, butchers, and others interested in the subject, are, for the most part, so firmly fixed by their prejudices, that it is utterly useless to suggest more correct notions upon the origin of the fluke. In simple nature there is nothing sufficiently wonderful to captivate their imagination. If it were not uncharitable, I should be ready to say, that these parties are so prone to the marvellous, that any proposition concerning the origin of the fluke, to command their belief, must be incredible. North of the Tweed, the same grades of society are, I am told, better educated; and, if so, they doubtless have their reasoning powers emancipated, in a greater degree, from the dominion of prejudice.

In my former communication, I restricted my remarks to the most immediate inferences from my own experiments. I esteemed it unwise to go farther. If we allow much latitude to conjecture, we are sure to go wrong. Contrary, however, to this conviction, as to that which is ordinarily the best mode of prosecuting inquiry, I now propose to submit some suggestions (mere conjectures) upon the subject. But I beg that they may be received as conjectural opinions, for every one requires proof in many ways. They may, however, be very advantageously substituted for those exceedingly crude notions which now prevail. To do justice to the subject, with the minimum of knowledge we possess, would be as impossible as it would be for a penny-a-liner, on a rayless night, with no other light than a farthing rush, to do justice to the magnificence of St Paul's Cathedral.

Sheep are liable to several diseases which are called "rot;" but that variety which is now under discussion, is that rot which is caused by flukes in the liver. It is the variety of which a whole flock, instead of here and there an individual, will sometimes perish in a few seasons.

"Bottling" at the throat, as it is called, is not in truth a symptom of this kind of rot: it occurs with a perfectly sound

liver. It is a symptom, and generally, if not always a fatal one, of "Rot of the Lights"—of gangrene following violent inflammation of the lungs: it never occurs without "rot of the lights." The rot of the lungs is generally caused by catching a severe cold, from either wet feet and belly, cold damp lodging, chills after hard driving, washing prior to shearing, shearing during inclement weather, and other similar occurrences. Sheep affected with this disease are more subject than healthy sheep to the rot of the liver from flukes. To account for this, are submitted the following conjectural causes: 1st, Those damp situations which are likely to give sheep cold, are also well calculated to preserve the vitality of flukes' eggs; so that sheep are exceedingly liable and likely to swallow flukes' eggs at the same moment that they are catching a fatal cold. 2dly, The fever and thirst which accompany the inflammatory stage of the "rot of the lungs," impel the animal to select the most succulent herbage, the production of rotting localities. 3dly, The same symptoms urge it to drink often of water probably loaded with flukes' eggs. 4th, The impaired digestion (vigorous digestion, it is assumed, is a powerful protector from the fluke) which accompanies this disease, increases the chances in favour of those flukes' eggs which may be swallowed becoming productive of mischief.

The rot of the liver, that variety which is more the immediate object of discussion, I unequivocally attribute to this circumstance alone—two or more flukes, the produce of flukes' eggs taken in by the mouth, find an entrance into the gall-vessels of the animal. I cannot admit any other cause for a single moment. Sheep may, indeed, have inflammation of the liver, followed by abscess, by gangrene, by peritoneal inflammation and dropsy, from gall-stones, from bruises, and from all the casualties which may bring on the same disease in other animals; but it can only be wilful blindness that may confound a solitary case of this sort with the rot.

Some persons seem to admit that the fluke may be originated in the liver of sound sheep, otherwise than by being propagated by the egg of its parent—that it may be somehow spontaneously engendered by the food of the animal. I cannot assent to any such notion. We have no occasion to resort to any such

supposition: the eggs of flukes are unfortunately too abundantly commingled with the food and drink of sheep. There are animalcula which may be divided and subdivided, and every fragment will live on and become perfect, as completely in appearance as a cutting from a gooseberry bush. There are jointed worms which may be divided at every joint, and every joint will live on, and become a thriving worm of its species. But no analogous mode of propagation appertains to the fluke. The production of intestinal worms of every kind—of the microscopical snakes of our intestines—of those of ordinary paste—of those microscopic animalcula which appear in water that has been boiled, and under other apparently inexplicable circumstances—of mildew, rust, smut, blight in corn—of fungi—of dry rot in timber—of mushroom-spawn (the last, I presume, is only the elongated radicle of mushroom seed, capable of throwing up a perfect plant at any point, under suitable circumstances) and of some other apparently spontaneously generated productions, and which have led some individuals to believe in the possibility of spontaneous generation, must all, including the origin of polypi in the frontal sinus of sheep, I have no doubt, be referred to generation by parentage. We must at present acknowledge our ignorance of the *modus propagandi* in many of these instances, but should hope, from research, for additional knowledge.

I have all along regarded the mouth as the inlet by which flukes' eggs find admission to the interior of sheep; and I assume that they are taken in with the food and drink of the animals. I cannot conceive that the eggs find admission *per anum*, or by the cuticular or pulmonary absorption. The eggs left adherent to grass, as foul water recedes from flooded districts, when sheep eat that grass, are, I assume, swallowed by the animals. This, I consider, is the most frequent mode of catching the rot. The eggs are so nearly of the same specific gravity as water—some of the apparently less perfect eggs actually float—that the least motion of the water sets the eggs in motion. The feet of the flock on going into water to drink, must instantly commingle the water and eggs; and the sheep, on drinking such water, must swallow many flukes' eggs. Sheep must also draw up many eggs from the bottom, when they drink such foul water

at shallow places,—which they are very liable to do, from the aversion of the animal to go deeply into the water to drink. I do not suppose that flukes' eggs are ever borne upon the breeze, and snuffed by the sheep, so as to give the rot.

To prevent the entrance of flukes' eggs into the stomach, and young flukes into the gall-vessels of sheep, must be the primary object of those shepherds who have unsound land. If only a few flukes obtain access to the gall-vessels of a sheep, our hope of destroying them by any expedient, and of preventing ultimately the death of the sheep, must be exceedingly feeble. No medicine can act *directly* upon flukes which are once safely lodged in the gall-vessels: any medicine, to poison these flukes, must act by so altering the quality of the gall (the natural element of fluke) as to cause it to poison them. It is to be apprehended that such an alteration in the quality of the gall as would cause it to destroy the flukes, would be incompatible with the existence of the sheep: all the ordinary variations of this secretion, it is to be presumed, nature has enabled the fluke to bear with impunity.

Since, then, the case becomes hopeless the moment that a few flukes find access to the gall-vessels, and since our ability to hinder such a result is exceedingly uncertain, if once the animals swallow a few flukes' eggs, it becomes the duty and the interest of the shepherd above all things connected with the prosperity of his fleecy charge, to prevent the sheep from taking up, with their food and drink, any healthy eggs. The flock must therefore be prevented from grazing and drinking at any place to which it is possible flukes' eggs can have been carried by water; until the eggs which may have been so brought, shall have perished. The extinction of vitality in the eggs of flukes must be patiently waited for, before it will be safe for the flock to approach those localities.

To wait the extinction of vitality in the eggs of flukes by desiccation, after spring, summer, and autumnal floods, when the salutary operation of frost cannot be expected, will often prohibit the use of very valuable and extensive tracts of meadow land, until an exceedingly inconvenient period, and so as to be attended by considerable loss to the tenant or landholder. He will find himself placed between the horns of this dilemma: he must either risk the rotting of his flock, or he must use for its

occupancy, lands which are wanted for other purposes. In deciding upon which evil to encounter, he will doubtless exercise his best discretion.

The period of prohibition of dangerous meadow land, will be in spring, summer, and autumn, so many days after the disappearance of foul water, as the eggs of flukes will endure desiccation without perishing. It must be exceedingly important, therefore, to decide, by experiment and observation, how many days, even how many hours, the eggs of flukes will retain their vitality in a dry state, at the temperature common to meadow-grass close to the earth. If this point were well ascertained, the herdsman would then, on carefully noting the date of the disappearance of foul water, be able to turn his flock upon his dangerous land, on the earliest day upon which it would be safe. When shepherds shall renounce all fanciful notions as to the cause of rot, and direct their attention to the real seat of danger, (the existence of healthy flukes' eggs) they will probably, before a long time, be led, by experience, to decide upon the duration of vitality of dry eggs. Until something of positive knowledge upon this point shall have been obtained, it may probably be prudent to allow twenty or more days to extinguish the vitality of flukes' eggs by dryness. Until we possess definite knowledge to the contrary, it will be best, I should conceive, to assume, that flukes' eggs, whilst in water, at a temperature above the freezing point, will retain their vitality unimpaired for some months. It may not be the case; but, until we know the contrary, it will be most safe to assume this position.

Late in autumn, in winter, and early in spring, the extinction of vitality in flukes' eggs, will be effected by frost, when the cold is sufficiently severe. One night will probably be ample, if the frost be severe enough to encrust the surface in boggy places, and if there be no foul water left unfrozen at the root of spongy sheltered turf. A frost less powerful cannot be expected to render boggy places, and sheltered wet spongy turf, safe pasturage.

If there be no puddles of foul water standing, no boggy spots, no spongy turf at the root of which is unfrozen foul water, it is probable that a hoar-frost, or such a degree of cold as will congeal the dew upon the grass, and render the blade crisp, would

“sweeten the pasture,” or render it safe, by freezing the flukes’ eggs; but if there be foul water about the root of the turf, in any shape, it would probably be unsafe to rely upon a hoar-frost. A hoar-frost may, on some occasions, even increase the danger to a flock, especially if it be turned out whilst the hoar-frost is yet upon the grass. To avoid the frozen blade, the sheep would bite very low, would select the boggy places, and wherever the grass is least frozen—just those localities where undestroyed eggs would be most likely to be taken in. Experienced old shepherds, in open fields, have stated that some flocks have been preserved sound, whilst those of neighbours using the same pasture have been all rotted by the following slight difference in the management. Sheep kept in fold on a morning until the sun had taken off the hoar-frost from the grass, all escaped rot; those turned out an hour earlier, whilst the hoar-frost was yet on the grass, all rotted. I do not vouch for the accuracy of the shepherds’ decision: they may have erred as to the cause of rotting and safety. The remark, nevertheless, may be submitted to the farther observation of practical herdsmen.

To expedite the destruction of flukes’ eggs by desiccation in summer and mild weather, and to enable a hoar-frost, or a very moderate frost, to work the salutary effects of a more severe frost during the colder periods of the year, too much attention cannot be bestowed upon draining the land, and upon filling up depressions.

Land springs cannot bring flukes’ eggs; they produce merely filtered water, not bearing a single egg. If, however, they be so situated that their moisture and rippings can protract the duration of life in eggs which may be brought into, or which may be dropped from rotten sheep into their course, they should be cured by underdraining.

When the principal object is to render fat flooding meadow land as soon as possible after the last flood, safe pasturage for sheep, surface draining, if there be fall enough, will, if it can be executed without leaving depressions in which foul water can stand, be all that may be required. But surface draining, to be *perfect*, agreeably to the wishes of the anxious shepherd, *must have no depressions* in which foul water can stand; not only throughout the meadow’s area, but also not even in the ditches

and drains themselves. The exit of the principal ditch or drain into the carrying stream should be the last spot to be dry: before the last ripple at this point, the meadow, its ditches and drains, should be all dry, or clear from standing water.

On casting an eye over those rich flat flooding meadows which are commonly known as rotting land, one sees continually in the ditches and drains, depressions in which foul water stands for days and weeks after the exit into the carrying stream is quite dry. In some low pastures which have been formerly under the plough, in the furrows near to lands' ends, and in other places, one often sees depressions in which also foul water stands until it is evaporated by the sun and the wind. There are also sometimes upon a flat meadow's area local depressions and boggy depressions, a few inches only lower than the nearest adjoining drain, in which stands water preserving flukes' eggs for weeks. Any of these local depressions render the whole meadow unpasturable with safety for so many days, so many weeks, as the foul water lies longer than it otherwise would. In summer, these localities preserve the vitality of flukes' eggs, which would otherwise perish by desiccation; and in winter they protect flukes' eggs from the action of moderate frosts.

When there is fall enough, the remedy is simply to deepen the ditches and drains at those places which form obstacles to the depressions draining themselves. These are easily perceivable when there is only the least possible ripple along the ditch or drain. The workman has only to begin at the exit, and lay dry every depression, working upwards. Just as much caution, on his part, will be required, not to go too deep, by which error he would produce new depressions, as to go deep enough to drain the old depressions.

On very flat meadows it will sometimes happen that fall enough cannot be obtained to effect perfect draining by simply deepening the water-courses. In some instances, I have seen these already made deeper than the carrying stream; so as to be curable by no remedy but filling in. Sometimes the principal drain goes through the adjoining lands of a poor, or a desultory, or an unneighbourly neighbour—of one who cannot, or who will not, deepen his water-courses. In such cases, the only resource is to fill up the depressions with earth. In some instances, it

may be difficult and expensive to do this effectually. I can imagine the curled lip of the practical farmer of a thousand or two acres of flat meadow land, on reading the proposition. Generally, however, perfect draining, by such means, may be accomplished at not a formidable expense, and by the exercise of only very ordinary ingenuity, if advantage be taken of the precision afforded by the following simple means.

That period of the year when the ditches and drains just ripple, must be selected for the experiment. Examine the estuary, the emboguing of the principal ditch or drain, and decide upon such depth, at that place, as you can go without the danger of having foul water back in upon you from the carrying stream, or other channel into which you are conducting your own drainings. At this place is the chief difficulty. It will be often found that the ditch or drain, by repeated formings out, has been made too deep at this point. Sometimes, indeed, it will be found to be as low as the bed of the carrying stream; and, by no means unfrequently, lower than the level of the ordinary water-mark of such stream. When such error has been committed, the water from the carrying stream will back into the ditch or drain, and keep the locality unsafe for sheep pasture, long after the rest of the meadow may have become perfectly safe. The bottom of the ditch or drain at its estuary, then, should be as much above the usual surface level of the water in the carrying stream as can possibly be allowed, consistently with thoroughly draining the meadow.

Having decided upon the depth of the principal ditch or drain at its estuary, finish off a few feet upon a perfect level. At the extreme end of the newly-formed ditch or drain, dam up with clay or a strip of board, to one inch in height, or to some such depth; so that when the ripple of the ditch shall have collected to more than one inch, it shall flow over the dam. This one inch deep collection of water, in the few feet of newly formed ditch or drain, is to be used as the guide-water or level for the rest of the ditch or drain, until some considerable rise destroys its utility. The rest of the ditch or drain must be deepened where there is a rise, until the guide-water follows the workman just one inch deep, and not more; and it must be filled in with earth where there are depressions, until the guide-water stands

not more, or yet less, than one inch deep. When the ditch, on that level, shall have been completed, remove the dam. This will drain all that portion of meadow, of which the surface is a few inches higher than the bottom of the ditch or drain.

In the progress of the work, if there shall be met a rise which is considerable, or if the ditch shall have gradually become inconveniently deep, it may be necessary to form, in imitation of what the navigators of American rivers call a *rapid*, a more sharp ascent. At the top of this ascent or rapid, the workman must take a new level, and repeat the operation throughout, observing always to make the guide-water stand one inch deep, and no more, upon any level, before the dam is removed. All the minor drains, trenches, and furrows which are emptied into this principal ditch or drain, should be made in conformity to the same rule. Perfect draining for sheep-pasture (the estuary being dry, the whole meadow, its ditches and drains, will be dry) must be the result, except there be boggy or other depressions upon the meadow's area a few inches deeper than it will be prudent to carry the most convenient drain.

If such boggy or other depressions upon a meadow's area be of small extent, and very shallow, they may be filled up with a few loads of the scourings of ditches, or of mould from wherever most conveniently obtainable. If, however, they be of considerable extent, they might be prudently deepened, instead of being filled up. The earth thrown out may be used to raise the boundary, upon which may be planted a fence, to keep back the flock. The centres of such boggy or other depressions can never become safe sheep-pasture, until very late in the summer season. Rather than protract the period of safe pasturage until so inconvenient a season, over the whole meadow, it would be better to separate these localities, and use them for ozier beds, or other purposes. If they be made into reservoirs of water, with perpendicular banks, they would be considerably less dangerous to a flock than they are at present: sheep would be less likely to draw up flukes' eggs from the bottom on drinking than when the water shallows to nothing at its margin.

All the prophylactic measures hitherto dwelt upon, contemplate or aim at the destruction of flukes' eggs, whilst spread over

the surface of the earth, and exposed to the influence of the seasons, air, temperature, &c. We may recapitulate these measures as follows :—*1st*, To await the extinction of their vitality by desiccation in summer and mild weather ; to do which, with the least possible loss, prerequisites a knowledge of the duration of their vitality, in a dry state, at the usual temperature of grass close to the earth ; *2dly*, To await their destruction by frost in winter, and hoar-frost in autumn and spring ; *3dly*, To expedite their destruction, at every period of the year, by perfect surface-draining and filling up depressions.

Perfect success cannot, however, be expected to attend our most cautious endeavours. Sheep will sometimes accidentally stray from safe to unsafe pasture. They must necessarily be driven occasionally over unsafe localities, and they will, whilst passing, snatch up a mouthful or two of the herbage, and a sip or two of the foul water. From the extensive distribution of flukes' eggs, sheep will often get them into their stomach, from sources of which the shepherd cannot be aware. In spite, as it were, of the shepherd's utmost vigilance, flukes' eggs, uninjured by mastication, will pass into the stomach and duodenum. I propose now to follow them down the sheep's throat, and to dwell upon the feasibility of destroying flukes' eggs, or the embryo flukes, in the stomach and duodenum, before they gain access to the gall-vessels of the animals.

Whenever a flock may be supposed to have been upon dangerous pasture, our aim or intention should be immediately to destroy the flukes' eggs, or the young flukes, in the stomach and duodenum. This I would propose to effect, *1st*, By stimulating to the utmost the digestive powers of the animals ; for I assume that, in healthy sheep, 99 out of every 100 flukes' eggs swallowed, are destroyed by digestion ; *2dly*, By mixing with the sheep's food or drink common salt, or other salines, or alkalis or acids, which may be supposed to act by their causticity upon the eggs and embryo flukes ; and also those grasses, herbs, and medicinal plants, which experiment or observation may shew to be effective in destroying eggs and young flukes in the stomach and duodenum of sheep.

In the total absence of all positive data upon the following points, I assume, that, in the duodenum of sheep, the embryo

fluke escapes from its shell so far as to be able to obey its own instinct, which is to work its way up the gall-vessels of animals against an effluent current of bile. If the embryo fluke escape from its shell in the stomach of healthy sheep, it will be destroyed by the digestion of the animal. If the embryo fluke be carried past the entrance of the gall-vessels, or into the jejunum (the small long gut which begins just beyond the entrance to the gall vessels), before it be extricated from its shell, it will be expelled by the fæces of the animal and perish. I beg to repeat, that these are only probable assumptions, and require to be examined experimentally.

Flukes' eggs not unfrequently must find access uninjured into the stomach of nearly all grass-eating and foul water drinking creatures,—all domestic and wild animals, fowls, reptiles, and fishes. Hungry dogs often eat pieces of the raw liver of unsound sheep, when they must bolt thousands of healthy flukes' eggs. Butchers who slaughter sheep are in the constant habit of placing their knife between their teeth, and of eating with unwashed or imperfectly washed hands, by which they must frequently get flukes' eggs into their stomach. During my pursuits of collecting flukes' eggs, I am conscious that I must have had many down my throat* from one oversight or another. From the extensive diffusion of these eggs, then, all creatures not unfrequently get healthy eggs into their stomach; yet, protected by some feature of their process of digestion, very few, if we except sheep, deer, hares, rabbits, cattle, and some other ruminant or cud-chewing animals, are afflicted with flukes in the liver.

This exemption from frequent attacks of the non-ruminant animals does not depend upon any quality of their gall. The gall of all creatures is suitable enough for the *Fasciola hepatica*, if it once find admission therinto. It has been met with more or less frequently, and apparently in perfect health and condition, in the gall-vessels of man, of dogs, of swine, of poultry, of water-fowl, and besides other fasciolæ peculiar to some of them, of reptiles, snakes, and fishes. It may not unlikely be met with

* I have some distressing apprehensions that I have not done so scathless, and I feel it to be my duty to caution all persons who may be inclined to repeat the experiments related in my former communication, and to urge the unsparing and very frequent use of common salt during these operations.

least frequently in man, and the almost exclusively carnivorous animals; a little more frequently in the occasionally semi-omnivorous as well as herbaceous feeding animals; somewhat more frequently in the almost exclusively graminivorous non-ruminant animals; decidedly most frequently in the graminivorous ruminant animals; and in the warmly clothed sheep pre-eminently most frequent even in this class.

The inferences one would be inclined to deduce from the above data, supposing them to be indisputable, are, 1st, That the gall of all creatures is a sufficiently suitable element for the fluke, if it once obtain access to it; 2dly, That the process of digestion in animals which do not ruminate or chew the cud is unfavourable, in a greater or less degree, according to some as yet insufficiently ascertained modification of the process, to the young fluke during its instinctive efforts to get into, or the effort of nature to conduct into, the gall-vessels of these animals. Until we are better informed, I assume, that in such animals digestion protects them, by either its vigour in destroying the eggs or the embryo flukes in the stomach, or by its rapidity in hurrying the eggs beyond the meatus cysticus before the embryo fluke is sufficiently extricated from its shell to be able to obey its instinct. 3d, Rumination or chewing the cud, as part and parcel of the process of digestion, especially in the wool-clad sheep, is eminently favourable to the embryo fluke in its instinctive nisus. It may be assumed, to advance what may be termed the incubation or maturation of the egg to a state such as will cause the embryo fluke to become extricated from the shell of its egg sufficiently to be able to obey its instinct, just at the period it is passing with digested aliment along the duodenum, or between the pylorus and meatus cysticus. The equability of temperature maintained by the fleecy character of its coat, and other circumstances of which as yet we have no idea, may have some effect in rendering sheep more than other ruminants liable to be infested by the fluke.

There are two kinds of sheep pasture which are esteemed perfectly sound or safe, because flocks may be thereupon pastured with almost undeviating impunity, whilst it is morally certain that every animal thereupon pastured must swallow multitudes of flukes' eggs. The one is an inland hill and dale pasture of

very diversified character, and exceedingly commingled herbage ; the other is the pasture of sea-side flats, technically called salt marshes, over which flow sometimes foul flood-water from inland districts, at other times as during high tides salt water from the sea.

The former, or hill and dale variety of safe sheep pasture, presents puzzling anomalies ; but the cause of any anomalous circumstance, if it be once fairly brought to light, promises to be of more utility than almost any other in enabling the shepherd to guide his flock with subsequent safety. I therefore expect the practical herdsman to be diligently inquisitive after the cause or causes of security whilst I pen the following suggestions.

Sound and unsound sheep may be pastured together upon these pastures ; the sound, except they catch cold, or become otherwise ill, so as to impair their digestion, will continue sound ; but the unsound will progress to destruction. The droppings of the unsound sheep will be charged with flukes' eggs ; and hasty rains will splash and scatter the eggs to some distance upon the circumjacent herbage. The feet of the flock will also carry them, and brush them upon the herbage, one knows not where. Tremendously hasty showers, except the soil be exceedingly porous, will float and wash them into the herbage at the foot of every declivity ; so that the sound sheep must inevitably pick them up on grazing. They, nevertheless, for the most part, continue sound, or free from flukes.

To what circumstances do sound sheep owe their exemption under such circumstances ? The animals still ruminate, or chew the cud—so far as that process is favourable to the success of the embryo flukes, they have still the feeble advantage of it. The olfactory power of selection of the animals, especially where herbage is abundant and various, may have some effect. This opinion is in some degree strengthened by this circumstance : sheep which are urged by hunger to be less choice than others, (as when pasture is scarce), although hunger may be regarded generally as a sharpener of digestion, are more subject than others to take rot. Such sheep, however, bite nearer to the earth than others ; and thus increase their liability to pick up healthy flukes' eggs. Selection by the nose cannot, howe

be supposed to be sufficiently discriminating, to enable the sheep to steer clear of swallowing many eggs ; and we are driven to seek for some other cause of placing sheep so nearly upon a par with non-ruminant animals, whilst they enjoy such pasture. Digestion seems the protector of the non-ruminant animals, under precisely similar circumstances ; and I am driven to assume, that sheep, whilst enjoying such pasture, owe their exemption from attack to improved or invigorated digestion.

If an individual sheep becomes the subject of any other disease, so as to enfeeble his digestive powers, he will, I apprehend, often become the victim of flukes, whilst his healthy companions will continue sound.

In deference to the confident assertions of practical herdsmen, I suppress my doubts of the existence of any pasture upon which sound and unsound sheep can be quite safely pastured together, during wet weather, for any length of time ; and as if the opinion were established, proceed to suggest, that some grass or herb, of which the specific effect upon digestion in sheep, is, as yet, not known, may be met with and selected by the animals. The large round intestinal worm of the human race, of which the local habitation is the stomach, can exist only whilst the digestion of the patient is enfeebled : improve the patient's digestion, and the worm will be destroyed by the powers of the stomach ; so that a stomachic, which will restore the tone and vigour of the stomach, is, in effect, a perfect vermifuge. On the same principle, some plant met with by sheep on an exceedingly diversified pasture, may become a potent *fasciolifuge*. In the sequel, we shall have to allude to the effect of muriate of soda, or common salt, as being distinctly a fasciolifuge of the first order, probably from the causticity of its constituents. Amongst the diversified herbage there may be a plant of which the juices contain soda or some other alkali,* rendering the herb at once

* Your observant and practical correspondent, Mr Hogg, in the note at page 246 of your last number, attributes the virtues wanted to "the different kinds of heaths,—ling, deer-hair, all the varieties of bent, &c." An individual so capable, as seems your correspondent, may probably devise a means of ascertaining which of these possesses the most marked preventive powers. Attention well directed to this point, must, I think, lead to good results. There is evidently more to be hoped from preventive than from curative remedies.

grateful to the palate of sheep, and destructive, by its causticity, of young flukes. Or the juices of some plant may contain an acid, which, if the shell of flukes' eggs be calcareous, like those of many oviparous creatures, may act directly upon the egg, and destroy the embryo fluke. The juices of some plants contain essential oils: these are usually peppery, aromatic, and bitter; and may act powerfully as stimulants of the stomach, and rouse it to increased action. The juices of some plants contain an acrid ptysmagogue, which may considerably augment the salivary and gastric secretions, the usual adjuvants of digestion. It must be superfluous to do more than simply remark, that if any distinctly fasciolifuge plant of which sheep are fond, should be discovered among such compound pasturage, it would be of almost infinite utility, at nearly any cost, to introduce and maintain it upon all rich, flat, rotting meadows.

Admitting our present ignorance of the precise cause, and the opinion of practical herdsmen, the result probably of repeated observation, that sheep, being in perfect health, continue free from flukes, whilst others of the same flock, on becoming ill from other causes, become infested by the fluke, we are driven, by our total inability, to refer the circumstance to any other

The following is taken from a report in the Atlas, of the proceedings of the Linnæan Society at one of its meetings. "At the meeting, A. B. Lambert, F.R.S., V. P. in the chair; the Secretary, Richard Taylor, Esq. read a paper, transmitted by Robert H. Schomburgk, a Danish naturalist travelling in South America, descriptive of six varieties of an interesting water rock plant of the species *locis* (*Schreber*), termed Weya by the natives, which he found growing on the granitic dykes of the river Essequibo, and which, though covered every flood with fresh water, retains a considerable quantity of salt, highly prized by the natives as a condiment, and to obtain which they gather dry, and burn the plant to ashes, in which state (says the author) "their children eat it as eagerly as those of Europeans do sugar." This plant forms the principal food of an excellent fish, named Pacou by the Indians, which is furnished with eighteen molar teeth (nine in each jaw) set in sockets, and closely resembling those of a sheep, and by aid of which it crops the herbage of these rocks." Have we any native plant resembling the Indians' Weya? Could any of the varieties described by the adventurous Dane, be naturalized in this climate?

Is there not in some parts of England a lichen, which is sometimes preserved and eaten by the peasantry, because of the quantity of salt which it contains? Many years since a gentleman of Derbyshire gave me a morsel to eat with some such report concerning it.

probable cause, to regard the vigorous condition of the digestive organs as the shield of safety to the healthy sheep, and the impaired condition of these organs as the cause of liability of unhealthy sheep. The stomach, the principal organ of digestion, is the receptacle of flukes' eggs—the nest in which they are hatched. Incubation or maturation, which for hens' eggs is performed by the sitting hen, for those of the ostrich and some insects by the sun, for those of many insects and animalcula by animal and vegetable fermentation, is performed for flukes' eggs by the digestive process of animals. Digestion is the in-part mother of young flukes, or conducts the embryo flukes until they are about to quit the shell. Every modification of this process has, therefore, a marked effect upon the production and after success of infant flukes. With as near an approximation to truth as will be required by "persons who count their chickens before they are hatched," we may say, that digestion in man, dogs, &c. will produce, from the flukes' eggs swallowed by them, of lucky young flukes that succeed in obtaining access to their gall-vessels,

	1 in every 10,000 eggs.
In the non-ruminant, as the horse, ass, &c.	1 in every 1,000 ...
In ruminant animals, not being sheep,	1 in every 500 ...
In healthy sheep,	1 in every 100 ...
In sickly sheep, with impaired or enfeebled } digestion, }	50 in every 100 ... or 1 in 2.

There can be little doubt but that ill health produced by a few flukes already in the liver, the produce of eggs picked up when not suspected, has been often mistaken for ill health from other causes, and regarded as only predisposing to rot—the early symptoms of rot are thus erroneously regarded as a predisposing cause of rot.

Salt-marshes, or low lands by the sea-side, or on river sides near the sea, which districts are alternately washed by high-tide sea-water, and flooded with foul inland water charged with flukes' eggs, are proverbially sound sheep-walks. Situations which, further inland, would be regarded as the worst or most sure kind of rotting land, become, from being washed occasionally with sea-water, not only perfectly sound sheep-land, but are sometimes said to benefit animals already diseased. The salubrity of such situations is presumed to depend upon the action of sea-

salt, of which a small deposit will be left upon the grass, as, after the subsidence of the last tide, the aqueous part of the compound called sea-water is evaporated by the wind and sun. Any small impregnation of iodine in the sea-water is not looked upon as operating in the case.

As sea-salt or common salt, the muriate of soda, can scarcely be denied the merit of conferring salubrity upon such situations, it is conspicuously pointed out as a sovereign fasciolifuge. A cheaper one could scarcely be hoped for. It would seem to be eminently calculated for the object of destroying flukes' eggs in the stomach of sheep, without reference to any effect it may be supposed to have upon eggs exposed to its action when held in solution by sea-water. The most expert chemist could scarcely demonstrate whether or not the soda is attracted by some substance in the stomach of sheep, setting at liberty the muriatic acid to make its attack upon any calcareous matter in the shell of flukes' eggs. We may therefore pass over these profound minutiae, and look only to its action as a saline.

The well known action of salt upon the leech, which in many of its characteristics so nearly resembles the fluke, ought at once to point it out as an excellent fasciolifuge. Worms, snails, slugs, and similar creatures, in proportion as their covering is sensible, soft, and moist, are readily destroyed by salt. It may, however, be argued, that bile, the natural element of the fluke, contains, according to chemists who have analyzed it, muriate of soda, as well as sulphate of soda and phosphate of soda; and consequently the fluke is not very likely to be powerfully affected by salt. To supersede all lengthy and recondite disquisitions upon the multitudinous and multifarious transformations which take place in the crucibles, alembics, and retorts of the chemist whilst analyzing animal compounds, the shepherd or butcher philosopher, on killing a rotten sheep, and taking out its liver instantly after death, whilst the flukes are yet alive, having the whilst suffered a tea-spoonful of common salt to dissolve in his own mouth, may cut into the liver, and squirt the contents of his mouth instantly amongst the prodigal inhabitants, when he will see the effects of salt upon the patriarchs of the colony. Its effect must be supposed to be more sudden and more

powerful upon the tender skin of the infant or embryo fluke—the only variety which is likely to be met with in the stomach of sheep. On the whole, there can be little doubt but that common salt is a most potent fasciolifuge, whilst the young vermin are yet in the stomach of the sheep, or only on their route to the gall-vessels. It would seem, therefore, desirable to keep a moderate supply of common salt in the stomach of sheep, whilst, and for a few days after, they are using unsound or suspicious pasture.

The practical herdsman would probably do well, when his flock may have accidentally or unavoidably grazed upon rotting land, to give his sheep an hour's run, twice or thrice a-day, upon acknowledged sound pasture of the most commingled herbage, that the animals may pick up some plant which stimulates their digestive organs. If he would improve upon this, he might give, with some prospect of advantage too, as often as twice or thrice a day, a little barley-meal, with chaff and salt, or good hay wetted with strong brine, as food, or hay-tea, with salt, for drink. This probably is all that the practical herdsman can do, during our present ignorance. To be efficient, this should be done the instant the risk has been incurred. It would doubtless be utterly useless, after a few flukes shall have gained access to the gall-vessels. To give salt, in any shape, as a preventive, it should, if possible, accompany the eggs down the sheep's throat. To give it more than three or four hours after the eggs have been swallowed, would place its reputation in jeopardy.—Whether other saline or alkaline salts, or medicines of any other character, would answer better than common salt, requires to be proved by experiment and observation.

If flukes' eggs have not perished by desiccation and frost, and if they have escaped destruction by digestion in the stomach of sheep, they will produce young flukes, which are likely to make their way up the gall-vessels into all the biliary tubes of the liver. How faint soever must be our hope of destroying flukes in the gall-vessels, no shepherd can suppress the wish so to do. If this could be accomplished, the parents of these eggs might be thinned exceedingly, and thousands of valuable animals in a year saved from a profitless death. At present no medicine is known to have the slightest effect upon flukes once lodged in

the gall-vessels of sheep; all the assertions of impudence, knavery and quackery, to the contrary notwithstanding! The shepherd who shall first discover means of destroying mature flukes in the gall-vessels of sheep, if his lucky discovery, joined with his own ingenuity, do not render him as rich as Croesus, will, at all events, entitle himself, 1st, to the lasting gratitude of mankind, and 2dly, to the Colchian Fleece, or a Crook and Pandian Pipe of gold from the British public. I sincerely wish he may get them, and how unmindful soever may be the public at large of his deserts, I trust he will from the contributions of his benefited brethren, if there remain one spark of generosity amongst the modern professors of this ancient pastoral craft.

Common culinary salt, which may be esteemed the most effective medicine yet known for destroying flukes' eggs or young flukes whilst upon their route to the gall-vessels, would have not the least effect upon those flukes which are once safely lodged in the liver. Salt cannot bite a young fluke, even by the tip of its tail, after it has turned the corner of the *meatus ductus choledochus*. A solution of salt would pass by the mouth, or the entrance to the gall-vessels, without communicating any effect whatever to the gall (which is always pouring outwards) at the distance of one-eighth of an inch up the vessels. The same will be the result also with every other medicine. No medicine, therefore, can have any *direct* effect upon flukes lodged up in the gall-vessels: it were quite hopeless to hope it. To procure the effect desired—direct destruction of flukes in the liver, a solution of the medicine, whether it be salt or any other, must be injected into the gall-vessels, even the minutest of them; and this, of course, would kill the sheep, and require a Magendie in every sheep-fold.

A medicine to have any effect upon the flukes in the liver, must act by the circulation through the whole system of the sheep. It must so alter the quality of the bile or gall, as to render it poisonous to the flukes which live in it. Gall is the natural element of the fluke, and nature has endowed it, doubtlessly, with the capability of enduring with impunity all the ordinary variations of its quality. It can be only *very extraordinary* variations in quality, perhaps such as are incompati-

ble with the life of the sheep, that can render gall poisonous to flukes.

The subject is, however, of an importance that would abundantly justify the sacrifice of a few sheep, in making trial of those medicines which are known to act with potency upon the hepatic system of man, and any other which observation may show, or ingenuity devise, to act powerfully upon the bilious secretion of sheep.

Oxymuriate and submuriate of mercury and the blue pill, all of which have a powerful effect upon the hepatic system of man, arsenic, prussic acid and other prussiates, any other exceedingly potent medicaments, which may be supposed likely to act upon the biliary secretion of sheep, so as to render it poisonous to flukes, cannot be safely entrusted with shepherds and stock-owners as internal medicines for sheep. Precautionary arrangements under the most skilful hands, would be absolutely indispensable. Overlooking the liability to accident of the shepherd and assistants, a whole flock might be poisoned by the least imprudence, incautiousness, or over-dose; at the same time, nothing short of a very full doze could reasonably be expected to prove effective. Whether any dose of these or any other medicine, however administered, would have the effect of destroying the fluke in its liver, before it poisoned the animal itself, can be decided only by careful experiment.

Preparations of turpentine, balsams, resinous and gummy extracts, and vegetable poisons in substance, ammonia and other powerful alkalis, and any of the more potent saline salts, whenever they are tried, should have their action watched by persons fully competent to discriminate the real effects of the remedies used.

The symptoms of rot in living sheep, are known to the shepherd much better than to me. When the butcher's knife does not interpose, death, after a longer or shorter period, is pretty uniformly the ultimate result. Examinations after death lead to the following inferences.

The irritation caused by flukes in the liver, superinduces in some instances circumscribed inflammations of the gall-vessels, and the circumjacent parenchyma of the liver. Some of these are of very limited extent. If the fluke or flukes whose pre-

sence and activity produced the mischief, should become detached from their hold, they float out with the gall, and perish, and the inflammation subsides; sometimes harmlessly, at other times leaving indurations and tubercles. Sometimes these tubercles suppurate and form complete abscess of the liver. This ends in death.

Sometimes, but by no means frequently, the inflammation is so violent and extensive, as to seem to be the immediate and only apparent cause of death.

Very often the inflammation is communicated to the peritoneal covering of the liver; when it can scarcely fail to spread, more or less, over the outer coat of the stomach and intestines. In these cases, if the animal survive the stage of active inflammation, a chronic inflammation ensues. This produces, earlier or later, dropsy of the abdomen, of which the animal dies.

One is led sometimes to suspect that the irritation of a fluke or two far up in the lesser gall-vessels, so far inflames the biliary pores as to check the formation of gall, and thus superinduces jaundice or the yellows, as it is called. Knots of dead flukes sometimes collect at the angles where gall-vessels run into each other or join, and partially obstruct the flowing out of the gall; and sometimes seem to block up the ductus choledochus as if they would totally stop the flow of gall. In either, or any degree of either of these cases, the animals become jaundiced, in one degree or another, from the reabsorption or nonformation of gall.

When the hydropical affection is unaccompanied by the icterical affection, the serous collection in the abdomen is not much discoloured, and the sheep is said to die of "the white water."

When the dropsy and jaundice are united, the collection is tinged more or less conspicuously with gall, and the animal is said to die of "the yellow water."

If the latter case be accompanied by newly established patches of inflammation upon the peritoneum, the colour of the collection becomes much heightened, (perhaps from a semi-sanguineous exudation,) and the animal is said to die of "the red water." In either and every case, death is the unavoidable ultimate consequence.

The fluke seems to cling * to the lining of the gall-vessel on the same principle by which a leech, at his tail end, clings to any substance. I suspect they do not bite like a leech; but simply suck like a fly's foot, to maintain their hold. If a full grown fluke be once loosened from its hold, I doubt whether he ever can fasten again; I presume he is doomed to perish. I judge that whilst it is holding on by its mouth, its pliant body floats in the passing gall, and, if the number be not excessive, is scarcely felt by the sheep. When the number becomes so excessive as is often seen, however, they may probably impede the passage of the gall, and produce a sense of fulness and weight in the liver. I am led by circumstances which I need not relate, to suppose that it is when they copulate that they become the cause of the greatest irritation and mischief. Two flukes contiguously attached, when they unite, must pull in contrary directions, each hanging by its head or mouth. The effect may be likened to that produced by the pull of a leech, except that there is no biting, when it is determined it will not, and you are determined it shall loose its hold, or it is like the action of a cupping glass in miniature. If two anxious pairs inconveniently cross each other, the pulling and irritation which result are probably much increased. One or more of the flukes may be torn from their hold, perhaps tearing up some small and tender vessels to which they have clung, when, I expect, they perish.

To conclude.—In submitting my views, as above, of that very destructive disease called the rot in sheep, I by no means feel a desire pertinaciously to uphold the mere conjectural opinions I have advanced. I shall very readily acquiesce in the modification of any of them, shall even cordially rejoice at the refutation, by real proof, of the most plausible. I tender them

* The term "*Fasciola hepatica*," or little binders of the liver, is, I should conceive, applicable more particularly to those flukes which thrust themselves far up into the lesser gall-vessels. These are sometimes rolled upon themselves so as to resemble in some degree, as to shape, the shells called olives. When the vessels are large enough I have not often found them adherent to the sides of those vessels over their whole body, as I expected from the name; but only the head part has been tenderly adherent, and their body, of the shape of a flounder in miniature, delicately waving about in the pure gall.

as valuable only in proportion as they may serve the purpose, 1st, of inducing those who are deeply interested in such matters, to think or direct their observation home to the subject, instead of indulging in vague and even incredible conjectures; and 2dly, of enabling them to adopt their precautionary or preventive measures with something of judgmatical precision against the danger with which they have to contend. The opinions which I should more solicitously maintain, because I have proved them, I conceive, by observation, are the following: 1st, that flukes deposite innumerable eggs; 2dly, that these eggs, (of which some probably hatch without ever leaving the gall-vessels,) for the most part float with the bile or gall into the duodenum; 3dly, that in the duodenum and jejunum they communicate with the contents of the intestines; 4thly, that they pass on uninjured with these contents, and are to be found in the droppings of unsound sheep every where; 5thly, that they are liberated from sheep dung by rain and water, and are extensively diffused through foul or surface drain water, and scattered over lowland sheep pasture almost universally; and, 6thly, this one assumption, that by or from these eggs, somehow, and by no other means whatever, are produced the first few flukes—the patriarchs of the future colony in the gall-vessels of previously sound sheep.

ON THE CLAIMS OF THE LANDED INTEREST TO LEGISLATIVE PROTECTION.*

THE author of this publication is already known to our readers as the writer of a prize essay on the "Management of Landed Property in Ireland," and of one on the "Improvement to be made in the cultivation of Small Farms;" and as a practical improver of two extensive estates in Ireland, which, happily for that country, have been committed to his superintendence. We say *happily*, because we have ample evidence that the system of farm management so beneficially introduced upon those estates

* The Claims of the Landed Interest to Legislative Protection considered. By WILLIAM BLACKER, Armagh. Published by Ridgway and Son; and William Curry jun. and Co., Dublin. 1836.

by the admirable agent whose work we are about to notice, is likely to extend itself to many other districts of Ireland.

The book is addressed to the Marquis of Chandos and the Committee of the Central Agricultural Association, and comprehends an extensive range of matter,—the corn-laws, the currency, the banking system, and many subordinate subjects bearing upon the principal one.

The first part is a digest of that abstruse and little understood science, called political economy; and contains those elementary principles which economists, from Adam Smith's day to our own, have propounded with more or less air of solemn gravity and pompous truism. With the exception of two short quotations, we shall omit any distinct reference to the first four chapters, which commence with the rise and progress of nations to wealth and prosperity, and involve points connected with commerce and manufacture, somewhat too argumentative and abstruse to suit the taste of the generality of agricultural readers.

"Any community which exports articles of permanent value, and imports articles which, like spirits, wine, fruit, &c., perish in the consumption, carries on a ruinous trade. For example, Great Britain exporting her hardware and other valuable manufactures to France, and receiving in return her wines, brandies, and fruits, carries on evidently a losing trade; she loses what she gives, and she loses what she gets; her manufactures are gone, and the wine, brandies, &c. are soon gone likewise, and leave no trace behind; as far as the capital of the country is concerned, the hardware, &c. might as well have been thrown into the sea, for any thing which remains out of the return made for it. In a similar traffic carried on in the internal commerce of a country, the case is precisely the same, however it may appear to differ. The grain that is employed in making beer or spirits, is a valuable property, calculated to support productive labour, and, by being so applied, to be converted into something of permanent value, capable of accumulation, and increasing the wealth of the community; but the moment it is converted into beer or spirits, it loses the quality it formerly possessed of supporting productive labour; and in regard to any power of adding to the national wealth, it has ceased to have any value whatever. The person who buys it, gives his money for that which perishes in the enjoyment, and after its consumption profits him nothing."

We doubt the soundness of the reasoning in this passage; we cannot see why "our hardware, &c. might as well be thrown into the sea, for any thing which remains out of the return made for it," because the brandies, wine, &c. are *soon gone*: Wine or any other article of consumption is *wanted* (whether unreasonably or not is another affair, and does not affect the argument),

and must be procured, and, unless *exchanged* for the hardware or other manufactures, how are these to be exported, and, consequently, how are the manufacturers to be maintained? Again, grain, "a valuable property, calculated to support productive labour," is not less "capable of accumulation, and increasing the wealth of the community," when converted into beer or spirits, than if used for any other purpose. Suppose it were applied to the production of *beef* instead of *beer*, is not the one as perishable a commodity as the other? nay, is not every article of food or clothing or furniture perishable in a greater or lesser degree? The proudest of our monumental edifices are perishable; and they add no more to the permanent wealth and *profitable* possessions of the community than does the wine or the beer, on the manufacture of which time, cost, and labour, have been similarly expended. The demand for certain articles of luxury, comfort, or of mere taste, exists, and the demand must be or will be supplied; and the progress of the exertions to supply the demand is at every step productive of the means of support to thousands, who, though concerned but in the raising of the most quickly consumed commodities, are thus afforded the capacity of "accumulation, and of increasing the wealth of the community," as fully as if they were occupied in the production of more permanent ones.

We do not mean, as will be readily seen, to say that the manufacturer of *wine* or *beer* or *spirits* (which we particularize merely because they are the signs used by Mr Blacker himself in his illustration), is not often the cause of injury to the consumer in his health and morals; but we endeavour to express our dissent from the inferences drawn from the *immediate perishableness* of the productions of national labour, as having no legitimate foundation in reality; but in truth our respected author himself grants, in the winding up of his argument, as much as we contend for: "All that can be said in favour of such a trade is, that the dealer in the home trade, and the merchant in the foreign trade, who deals in such articles, may, in his own person, be a gainer by disposing of them for a profit, and his profit, of course, adds to the capital of the community." Such labour tends to the accumulation of national wealth through the agency of active industry.

The first division of the subject almost closes thus :—

“ I proceed to consider the remaining part of the subject, viz. the legislative enactments necessary to develope and give effect to the capabilities we enjoy ; which may all without impropriety be included in the consideration of the present state of the agricultural interests, seeing how completely the doctrine asserted in the first proposition has been borne out by every view of the case, and how intimately connected the three leading divisions of the population have been shewn to be : manufacture and commerce being, as *producers*, dependent on the produce of the soil for the extent of their utility, and depriving themselves of their own best support, if they rob the cultivator of the soil of his fair remuneration, by insisting on too low a price of agricultural produce ; and, on the other hand, should the cultivators of land insist on such a high price for agricultural produce as would prevent the manufacturing and commercial classes (from) successfully competing with foreigners, these classes would in that case be rendered evidently unable to purchase ; and that a perishable produce being thrown upon their hands, the unreasonableness of the agriculturists would recoil on themselves. It appears, therefore, that the interest of all classes, when well understood, consists in keeping the price of agricultural produce *below* that which would disable the manufacturing and commercial interests from successfully meeting their continental competitors, and *above* that which would prevent the cultivator of the soil from being unable to pay the rent of his land ; the payment of which at the present rates, seems absolutely necessary to support the revenue of the country, and keep faith with the public creditor.”

Some of the preceding sentences are not sufficiently clear. It appears to us, however,—waiving a minute analysis of either sense or construction,—that rent must always eventually *depend* upon demand, and therefore that neither the manufacturer nor the cultivator can insist on any rate of prices ; artificial demand or supply, if created, cannot be long continued ; the cultivator must be enabled to pay the rent of his land, else he will cease to cultivate it, irregularities must find their level and remedy, although periods of distress and confusion—like that which succeeded on the transition of the united empire from a state of war to that of peace—may occasionally arise ; but the inference of Mr Blacker is sufficiently plain and undeniable, that legislative enactments should be such as to guard against *unequal* pressure upon the farmer, whose interests have not been of late sufficiently regarded by our rulers.

In the second part, the remarks on the banking and monetary system appear to us exceedingly good ; but these, as rather foreign from our objects, we must pass over with the expression

of our sincere acquiescence with the following well expressed opinion on points connected with the currency.

“Great capitalists, of course, make larger profits when discounts are difficult to be had, because they find less competition, and they are of course against facilitating discounts; but the extension of discount gives extension of capital, and this gives extension of employment, and promotes industry. This, therefore, is the interest of the country at large, and as to the rest, let the legislature look to the *security of the banks*, make them pay their notes in specie, and give over its cares and its fears about *over issues and over trading*, leaving merchants, manufacturers, and bankers, to take care of themselves and their own interests, which they are better qualified to do for themselves than any legislature is to do for them.”

We know that the present banking system, on the Scotch plan, is working admirably in Ireland, and do not apprehend any danger from its farther extension in that country, where circulating capital has been so much wanted. Though possessed of cattle and corn proportioned to the measure of his holding, the common Irish farmer had no facilities of raising a ready sum of money to meet any particular exigency, however advantageously he might apply it, without disposing of some of his stock or crop, perhaps at a very unfavourable season; but *now*, if he be solvent, and of reputable character, he easily obtains the needed supply, at the discount of five per cent. on his bill, which he most punctually retires, and is thus enabled to pay rent without prematurely thrashing out his corn, to purchase manure, or cattle for fattening, with a certainty of profit.

In some of these banks the principle of the poor loan fund system is applied with the best results, and on commercial principles, so essentially sound, as to ensure their stability and success. We hail the introduction of a widely circulating medium into Ireland, through the instrumentality of joint-stock banks, (which being *liable to pay in gold*, and *in the habit of exchanging notes with each other every day*, where rival establishments exist, are deprived of any chance of over-issuing and of occasioning consequent danger to the community), as one of the most probable means of stimulating the occupiers of its soil to spirited and profitable enterprize, of promoting habits of punctuality and integrity, and of elevating the national character.

Bank accommodations corresponding with their wants and means of payment, are afforded even to the farmers of the humblest class, and the regularity with which their promissory-notes

are retired, affords an auspicious symptom that habits of recklessness and mismanagement are not by any means so prevalent among the agricultural classes of Ireland, as to preclude the just belief that they only require *opportunities* of elevating themselves to a position of substantial comfort and self-respect ; and if the landlords of that country would, *as a body*, imitate the admirable examples afforded them by many of their order, and employ such men as Mr Blacker (if such can be found in sufficient numbers), uniting the good qualities of the *head* with those of the *heart*, “ the first flower of the sea ” would rapidly rise in the scale of nations. At the same time, banking speculations, like all others, may be pushed too far and occasion mischief, and we think, that in the *manufacturing* departments, too great facility of obtaining bank accommodation might have among the countless operatives the most lamentable results, by giving too much stimulus to competition among their employers through the means of unsubstantial capital. Competition among adventurous speculators would, it is true, act beneficially while it continued for the labour of the operative class, but the proportional diminution of the employers’ profits—or actual losses—would end in the abrupt discharge of the work-people, and then distress or ruin, and wide-spread panic, would ensue. We would avoid the extremes of a monopoly of wealth among a few, and such a minute distribution of it, through bank discounts, as would create among adventurers a temporary and convulsive stimulus, rendering the condition of the operative classes precarious at the best.

Our readers may be gratified by our giving them some of our author’s observations on the corn laws.

“ From a review of all circumstances, the prevailing opinion seems to have been established, that our agricultural interests ought to be protected, and acts of Parliament have been accordingly, from time to time, passed, in order to afford that protection, which, after many alterations and amendments, have ended in subjecting the importation of wheat, &c. to a graduated scale of duties ; my object, therefore, at present, shall be to consider whether the views of the legislature in this enactment might not have been obtained with more advantage to the nation by the imposition of a *fixed duty* in place of the *graduated scale*. I object to the graduated scale upon the following grounds, namely, that the highest price of grain is likely always to occur about the month of July, when the year’s supply must be nearly expended, and if the appearance of the coming crop should then prove unfavourable, the price is likely, from that cause, to be so increased that the ports are declared open for the

following three months, either entirely free, or at a very low duty: the consequence of which is, that the holders of foreign grain in bond, have, until the month of November, to bring their supplies into the market, and the importing merchant has the same period to introduce fresh importations upon the same terms—thus glutting the market with foreign grain, at either a nominal duty or entirely free, arriving at the time when the home grower is generally necessitated to sell off his crop—thereby taking away from him in *bad* seasons, the entire benefit of that protection which it was the object of the legislature to afford—and precisely at the very time when that protection was most required, namely, when his crop was most deficient;—so that the result of the corn laws, as they now stand, clearly appears to be, that the smaller the crop which the home grower has to bring to market, the smaller the price at which he is obliged to sell it. Nor is this all—for whilst the agriculturist loses in quantity of crop, and the rate of the market—the revenue is cheated of its duty, and the entire advantage is secured undiminished to the foreign farmer, landlord, or merchant. When the principle of protection being necessary, was admitted, it was natural to suppose the home grower would expect to have the benefit of that protection, *when his crop was most deficient*; but by the foregoing it appears the very reverse is the case, and the present corn laws, although a good protection in good seasons, afford no protection whatever in bad ones, exactly reversing the natural order of things. It may, however, be asked, what is the use of agitating this question now, when there is apparently so little chance of any injury arising therefrom—as prices are now, and most likely will continue, below the limits likely to encourage importation, and the article may therefore be said to be prohibited? To which it may be replied, that, for that very reason, the change is less likely to meet with opposition. As what *has been, may be,—now* is the proper time to guard against the recurrence of that which must be acknowledged to require alteration, and if not attended to at present, may unfortunately take place before a remedy can be applied. In making this change, it is not necessary to require any further protection, than that which was intended to be given, when fixing the price at which the ports are *now* opened for free importation.

“The standard adopted in the graduated scale has been proved to be quite sufficient, and if a fixed duty was imposed on the importation of foreign grain to such an amount, as that (at the average shipping prices from the continental ports since that standard was fixed), it would be made to stand the importer, equal to the price at which free importation is *now* allowed, say 70s. per quarter, no one need fear the competition—by this means in bad seasons the same protection would be extended to the agriculturist, which now only is secured in the good, and when importation had of necessity to be resorted to, the revenue would benefit by the importation, in place of the entire profit going into the pocket of the foreigner. It is quite indisputable that as Great Britain is the principal consumer of grain—if the ports were open, the price at Mark-lane would just as much regulate the price at Danzig or Hamburg, as they do the prices in Limerick or Waterford;—and it is upon a thorough knowledge of this fact (I believe), that the original framers of the corn laws preferred the *graduated scale* to the *fixed rate* of duty. By the former, the importer or consignee of bonded grain, could not tell what duty he would be

subjected to, and therefore was not induced to run up the prices in the continental markets in such a manner as would have been the case, had he been able to make a certain calculation—and the *chance* of having the grain admitted at a low duty, ensured a large quantity always to be remaining in bond—thus affording a certain supply to prevent speculative prices at home, and that supply, cheaply laid in, by speculation being checked abroad—so that the framers of the act, uncertain at that time, as to the possibility of a home growth ever being able to meet the consumption, cannot be accused of any want of prudence in their measures, which were well calculated certainly to provide a full supply for the nation. But now that it has been proved how fully adequate the home growth is to answer all demands, the state of the case is changed—and the law which was framed under that uncertainty, should now be amended when that uncertainty is removed.—It may be urged against the proposed change, that the imposition of such a fixed duty would be a virtual prohibition in ordinary seasons; and this I fully admit, but this result has taken place *already*—without any bad consequence arising; on the contrary, it has been attended with evident advantage. For when the present corn laws were enacted, free importation was allowed at 70s., it being generally admitted that 60s. would not be more than a remunerating price to the home grower—and if it could have been ensured that the average price in England would not have for the future exceeded that price, say 60s. per quarter, there seems little reason to doubt but that the consumers of all classes would have been, at that time, well pleased with such an arrangement—for *that was the actual average price when the present corn laws were enacted*; and the general expectation then entertained was—that the effect of the bill would have been to keep prices, with little variation, at or near the limit of 70s., the rate of free importation—very near which it continued for two or three years. But what has been the consequence of the protection thus afforded? It is this, that the agriculturist has been encouraged to greater exertions, by being relieved from the dread of foreign interference; and it now appears the United Kingdom, in the production of wheat, can so far outstrip the demand, that, between the scarcity of money and the plentifulness of grain, the price has fallen to an average of under 40s. per quarter, confessedly a non-remunerating price, and in country districts still lower; so that it is now actually consumed in large quantities for malting, and fattening cattle, besides an enormously increased consumption in bread, owing to the reduced price. A full supply, therefore, may be said to be permanently secured, and the dread now is, that, from the above-mentioned causes, the price will be such as to put a great portion of the middling land of Great Britain, where poor rates are high, out of cultivation entirely. The consequence of this would be most disastrous, for the agricultural labourer, being thus thrown out of employ, would fall back on the parish.—The manufacturing interest would then find the fatal effects of agricultural ruin, when taxed for the support of the unemployed labourer, and at the same time made to feel the loss of their consumption, and that of the ruined farmers, as a home market for their goods.—The ruin of all classes, in such a case, would appear to be inevitable. If *rents cannot be paid*, neither can taxes, and a national bankruptcy must ensue. *This is an impossible or even improbable circumstance to take place. Let wheat only*

fall for three years to come in the same proportion as it has for the three years last past, and the thing is done. Now the great additional supply which Ireland has afforded, has been a principal cause of bringing about the present depreciation in Great Britain; and it appears to me this supply might, in a few years, be *troubled*. If the plan of a four-course rotation of cropping was universally adopted throughout Ireland, there cannot be a doubt that it would be increased to this extent; even the general introduction of clover and proper drainage would double the produce; so that, in fact, the nation at present, has more to fear from such a redundancy arising as may destroy the English agriculturist, than any want of supply. It does, therefore, appear to me to be little short of insanity to advocate a free trade in corn, when the price is already reduced below the rate it bore in 1773; and it being evident from this state of things that no fears need be entertained of any want of supply under ordinary circumstances, it only remains to be determined whether, if any failure of the crops should open the ports, that plan of proceeding is to be preferred, which, by a graduated scale, would deprive the home farmer of a remunerating price for his scanty produce, and throw the entire profit of the British market into the pockets of the foreign grower; or, by imposing a fixed duty, reduce the unexpected profits of the latter, and place the difference in the British treasury. It seems, therefore, from what has been stated, that there cannot be a doubt but a fixed duty ought to have the preference in all such cases."

The foregoing observations have much force and truth, perhaps they are perfectly true; but being disposed to hope the best at all times, we may venture to question the certainty of any ruinous results to the farmer (supposing rents somewhat lowered, especially in Ireland, where if not positively they are relatively with the circumstances of that country much too high), even if wheat were to fall for three years to come, in the same proportion as it has done for the last three years, or that the redundancy alluded to should arise. We are not haunted with any morbid apprehension of too much food; for if the quantity be great, the total amount of price, though lowered in detail, would probably equal the average receipts of the farmer; and if *wheat* should become much cheaper, the manufacturing classes in England (whose wages do not vary with the size of their loaf), would be enabled to consume an increased portion of animal food,—thus creating, for the farmer's advantage, a remunerating demand in other produce than that of wheat: he would in such cases have less corn, and raise those green crops which would enable him to fatten cattle for the market. And the effect of this transition—which after all would only be temporary—would be the amelioration of those wheat districts which have

long under scourging corn crops, and in many places the introduction of improved husbandry. The substitution of one kind of agricultural produce for another, would not at all times have any ruinous consequences. We have no dread of too full a supply, nor of "putting any of the land of Great Britain out of cultivation entirely." We look to an increased consumption of animal food among the lower classes of the United Empire as a natural and certain consequence of the redundant supplies of corn or potatoes that may arise, and consequently as a counterbalancing source of profit in the farmer's books. Mr Blacker instances, as a proof of the increased consumption of wheaten bread in Ireland, the fact that sixty years ago it was brought from Dundalk to Armagh, a distance of twenty-five miles, and that *now* bakers are at every cross road in the latter county, and in every village. Why may not the demand for beef increase in the same way, preventing the apprehended danger of too cheap a loaf from the too extended culture of wheat? This we merely throw out as a *comforting* consideration, without entering into the complicated and really difficult question of the corn laws. One point is certain: The value of land has fallen, is falling, and will fall more. Let landlords then, especially Irish ones, calculate their expenditure accordingly, and if circumstances beyond, or within their own individual power to control, have caused them to suffer from mortgages and settlements, let them now, as far as possible, cut their coats according to the limits of their cloth; else the material for their future coats may be so scanty in dimensions, as not to allow the appendage of even a single skirt.

Our author enters very fully, and with considerable force of argument, into the inquiry concerning the policy of those laws which regulate the importation of articles which might be produced entirely or in part from our own soil,—and advocates the heavy taxation of all foreign commodities, whether for food or manufacture, that can be profitably produced at home; and particularizes butter, which, consistently with an opinion already canvassed, if used "as (necessary) food, to be rejected as making us dependent upon foreigners; if as a luxury perishing in the consumption, it ought to be rejected as a losing trade, in which (like bartering for ardent spirits) we lose what we give, and we

lose what we get." * * "We have had the experience of years to shew the propriety of affording a farther protection in butter, as we see the duty of 20s. per cwt. has neither diminished the quantity imported, nor has it increased the price of it, or *our own* produce of the same article, to the home consumer."

* * * "It is rank folly to allow the high price of our landed produce, which *our high taxes* occasion, to go to encourage the agriculture and fill the pockets of foreigners, who pay almost no taxes at all, leaving our own agriculture neglected and our treasury empty." In a note upon the importation of tobacco, Mr Blacker, whilst, in consideration of the vast revenue derived from its import, he admits that it should be cautiously dealt with, seems to favour its home production. On this point we are decidedly opposed to him. Experience has proved that the climate of Britain—the Emerald Isle inclusive—is unsuited to the growth of tobacco, which requires a powerful sun to render it excellent; and however the growers of it here would be inclined to oppose the *smuggling* of it from foreign parts, from self-interest and jealousy, their anxieties would not make them so alert as to prevent the smuggling of a far superior article.

The obvious injustice to the proprietors, or those possessing beneficial ownership of land (for on these, and not on the occupying tenants, does the tax really lie), in assessing for roads, jails, infirmaries, &c. in which all classes of the community have a common interest, is thus fairly pointed out: "As the offences against commerce and manufacture are more numerous than those against agriculture, and the population engaged in those pursuits furnishes a larger proportion of the inmates confined," it is certainly unfair to charge the land interest alone, with the expense of any establishments in which they have but a partial, and perhaps very disproportioned interest. In the case of *hospitals*, agriculturists, from the healthiness of their occupation, have far less occasion for them than any other members of the community. Such reasoning is perfectly just, and ought to free the land interest from this unlucky preference of taxation. With respect to tithe, Mr Blacker's remarks, though now of a retrospective tendency, are too good to be passed by.

"When tithes were first introduced, commerce, capital, and manufactures were equally unknown; and as a Church Establishment could not be supplied

without a tax upon something, it may be fairly surmised that it was put on the produce of land, because there was no other produce to place it on; but if the present state of things had then existed, it is equally fair to imagine, that the same arrangement would not have been made, and that those who did make it, could by no means foresee the unequal manner in which the measure would operate. Whether it may now be deemed expedient to adopt any alteration, is a matter not so certain; but if the arrangement were to be made *de novo*, there can be little reason to doubt that the landed interests would most strenuously, and with justice, oppose it."

It is lamentable to learn on such indisputable authority as that of Mr Blacker, that the humane efforts of some Irish landlords to introduce the system of minute husbandry which Mr Blacker himself has proved to be exceedingly beneficial to the farmers themselves, should be frustrated by their own obstinate and criminal opposition. We are informed—and our limits oblige us to be brief in the detail of particulars—that a gentleman in the county of Roscommon defrayed the expenses of a person from the estate of Lord Gosford in Armagh, to introduce the system of Mr Blacker from the one county to the other, and proposed to give him a farm (and to this no other individual had any claim whatever), worth a considerable sum, which the man was obliged to refuse, although he had no property whatever, from the threats held out to him by some of the Roscommon peasantry.

We sincerely lament that our want of room precludes the possibility of our giving more extracts from Mr Blacker's very interesting publication, or even noticing some other important subjects,—allotment of waste lands as a substitute for poor laws (Mr Blacker refers to Mr Blackadder's letter published in No. 28 of this Journal, in confirmation of his views)—and the observations on an article in No. 126 of the *Edinburgh Review*, entitled, "Progress and Present State of Agriculture." We must take leave of our respected author and his work, with a hope that his zealous efforts for the improvement of Ireland will be continued, and that his example will be followed by other gentlemen of the responsible class—that of land agents—to which he belongs.

ON THE APPLICATION OF STEAM TO THE PURPOSES OF HUSBANDRY.—No. IV.

It is now upwards of three years since, at a meeting of noblemen, members of Parliament, and gentlemen connected with the landed interest, brought together principally by the exertions of the writer, the three following resolutions, which he had prepared, were unanimously adopted :

“ *That the application of steam to inland transport and agricultural purposes will, by cheapening the production and saving the consumption of the food of the country, be accompanied by advantages to all classes of the community of the most extensive and permanent utility, and that, as such, this meeting considers it highly entitled to their support, and that of society at large.*”

“ *That the practicability of applying steam to general locomotive purposes was satisfactorily proved by evidence before a Committee of the House of Commons in 1831, who reported the same to be ‘practicable, safe, one of the greatest improvements in the mode of internal conveyance ever introduced, and entitled to legislative protection;’ and that, since that time, it has been farther and fully established by numerous successful experiments.*”

“ *That this meeting considers it desirable that an Association be formed for bringing the measure forward in the most prominent manner, which its own importance, political and commercial, and the exigencies of society require, to be called a Society for Promoting the Application of Steam to General Transport and Agricultural Purposes.*”

This Association, though about forty members of Parliament consented to act on the provisional committee, from the various political changes which occurred during the sessions of the years 1833 and 1834, came to nought; but it proved to be the nucleus of that co-operation on the part of a few zealous and persevering friends of agriculture, which, after surmounting many difficulties and discouragements, eventually realized, on the 15th of December last, the formation, in the metropolis, of “The Central Agricultural Society of Great Britain and Ireland.” On the occasion above referred to (23d of April 1838), the chairman, Henry Handley, Esq. M. P., observed, that he felt himself incapable of doing justice to the position in which the meeting had placed him, having no mechanical or engineering knowledge, nor boasting any scientific acquaintance with the subject; he was, however, strongly impressed with its immense importance; he felt steam was the most mighty engine as yet confided

to mortal hands, that its powers and resources had been hitherto but partially developed, and that he anticipated ultimately the greatest advantages to every class of society, from its application to the various purposes of transport and agriculture. Farther, he took occasion to observe, that he had, four years prior to the date of the meeting, entertained the project of the application of mechanical power to agriculture, and, for that purpose, had offered a premium for the invention of a steam-plough ; he had the assurance of many scientific men that it was perfectly practicable, and he attempted to form a society with a view to its encouragement, but failed. He still entertained the same opinion as to the advantages to be derived from it, and felt that as he feared the agriculturist would receive no legislative or financial relief, the only mode by which certain inferior natural wheat lands could be retained in cultivation would be by substituting inanimate for animate power, thereby diminishing the cost of production. In saying this he begged to observe, that were it probable the application of such a power would tend to diminish the demand for manual labour, he for one would never become its advocate. However, on the contrary, he felt satisfied it would very materially increase human labour, for, by displacing animal power, it would effect an enormous saving in the consumption of the food of man, and a reduction in the cost of cultivation. Colonel Torrens, M. P., who is well known to the public by his writings on political economy, in moving the first resolution, stated, that the Select Committee on Steam Carriages, which sat in 1831, of which he had been a member, had given the project a patient and full investigation, and had taken the evidence of a number of eminent engineers, and others practically acquainted with its detail ; that the Report embodied the full and explicit sense of the Committee as to the practicability, safety, and utility of applying steam to the purposes of locomotion. In reference to the economic advantages that would result to society from this extension of mechanical power, he believed they would be very great. The bringing of agricultural produce more cheaply to market would tend to increase profits, to encourage industry, and to enlarge the demand for labour, whilst considering how it would enable us profitably to extend cultivation, and apply with advantage additional portions of la-

bour and capital to the soils already under tillage, he did not consider it unreasonable to conclude that it will eventually double the wealth, prosperity, and population of the kingdom. These opinions were corroborated by Mr Shaw Le Fevre, M. P., who moved the second resolution ; by Sir John Sebright, Bart. M. P., and various other gentlemen, who addressed the meeting.

Having laboured for years, by means of the press, to awaken the attention of the agricultural community to this, in our opinion, most important subject, it is with great satisfaction that we are enabled to inform our readers, that, since the date of our last paper (December 1835), the application of steam to the plough has been made a matter of practical and successful experiment. The following is a correct account, by an eye-witness, of the recent exhibition, near Bolton-le-Moors, of the application of steam to bog cultivation :

“ The adaptation of inanimate power to the tillage of the soil must evidently have been considered by practical men to present almost insuperable difficulties, or steam would, probably, long since have been substituted for horses and oxen, as the motive power of agricultural implements. Certain light operations of the farm, such as thrashing, churning, chaff-cutting, &c., which could be performed by fixed power, have partially occupied the attention of mechanics, and suitable machinery driven by water, wind, or small steam-engines, has to some extent been advantageously used for such purposes. But the idea of a ‘ Steam Farm,’ of a farm to be altogether cultivated by steam, in lieu of animal power, has hitherto been treated as visionary and absurd, except by a few individuals, and one or two Agricultural Societies, who have enforced, in their publications, the practicability and importance of applying steam to effect the more laborious operations of agriculture. This desideratum is at length accomplished. Mr Heathcoat, M.P. for Tiverton, the ingenious and the well-known inventor of the lace machinery, has the merit of having conceived and planned this additional and remarkable contribution to science, and to the wealth of his country. The invention, after years of costly experiment, has been matured and perfected through the enterprising liberality of Mr Heathcoat, assisted by the mechanical ingenuity and perseverance of Mr Josiah Parkes, civil engineer, whom he selected to carry his designs into effect. The first machine has been constructed expressly for the cultivation of bogs, and has, for some months, been practically and successfully worked in Lancashire, on Red Moss, near Bolton-le-Moors. During the Whitsuntide recess of Parliament, a numerous assemblage of gentlemen from different parts of the country attended to witness an exhibition of this novel and interesting invention ; amongst whom were Mr M. I. Chapman, M. P., Mr T. Chapman, Mr H. Handley, M. P., Mr J. Featherstone of Griffinstown-house, Westmeath (an enterprising and successful bog-reclaim-

er), Mr F. Brown, of Welbourn, Lincolnshire, Mr James Smith of Deanston near Stirling (well known to the mechanical world by his ingenious inventions, applied both to agriculture and manufactures), Mr B. Hick and Mr P. Rothwell, engineer, with other experienced judges of mechanical contrivances. These gentlemen were unanimous in pronouncing the invention to be the germ of great improvements in the science and practice of agriculture, as well as eminently fitted for the particular purpose to which it has, in the first instance, been applied. Two ploughs of different construction were put in action, to the admiration of the spectators; particularly the one last invented, which is double-acting, or made with two shares in the same place, (?) so that it returns at the end of a "bout," taking a new furrow, without loss of time. The perfect mechanism of this plough—the action of the working coulters and under-cutting knives, which divide every opposing fibre of the moss—the breadth and depth of the furrow turned over—the application of a new and admirable means of traction, instead of chains or ropes—together with the facility with which the machine is managed, and the power applied to the plough, especially interested and surprised all present. The speed at which the plough travelled was two miles and a half per hour, turning furrows eighteen inches broad by nine inches in depth, and completely reversing the surface. Each furrow of 220 yards in length was performed in somewhat less than three minutes, so that, in a working day of twelve hours, this single machine would, with two ploughs, turn over ten acres of bog land! The machine which bears the steam-engine is itself locomotive; but as the ploughs are moved at right angles to its line of progress, not dragged after it, the machine has to advance only the width of a furrow, viz. eighteen inches, whilst the ploughs have travelled a quarter of a mile; in other words, the machine has to be moved only eleven yards, in the time that the ploughs have travelled five and a half miles, and turned over a statute acre of land. This is, in truth, the prime distinguishing feature of the invention; it is the contrivance on which the genius of its author is more particularly stamped, and which seems to be essential to the economical application of steam to husbandry; for it is evident, that were it requisite to impel the machine with a velocity equal to that of the ploughs, by dragging them with it, a great proportion of the power of the engines would be uselessly expended. Another valuable property appertaining to the machine, and which conduces greatly to its economy as a bog cultivator, is, that it requires no previous outlay in the formation of roads, no preparation of any kind further than a drain on each side of it. That a locomotive machine of such great dimensions and power could be so constructed as to travel on mere raw bog, was an excellence the more appreciated as it was unexpected by those persons who are conversant with the soft unstable nature of bog. The Irish gentlemen present also pronounced Red Moss to be a fair specimen of the great mass of the flat, red, fibrous bogs of Ireland, and that neither the machine nor the ploughs would have any difficulties to encounter in that country which had not been already overcome on Red Moss, the field of experiment. The engines are capable of working up to fifty horse power, but the operations subsequent to ploughing will require a small force compared with that necessary for breaking up the surface of the bogs, to the depth and at the speed effected by these ploughs. The power con-

sumed by each plough is estimated at about twelve horses, and the weight of the sod operated upon by the plough, from point to heel, is no less than three hundred pounds. The boiler is of unusually large dimensions for locomotive engines, being suited to the use of peat as fuel, so that the culture of a bog will be effected by the produce of its drains. At Red Moss, however, coals are so cheap, being found contiguous to, and even under it, that they are used in preference to turf. Eight men are required for the management of the machine and the two ploughs, or at the rate nearly of one man per acre; but it must be understood that this number of men will only be required for the first heavy process, and has no relation to any subsequent operations in the cultivation of bogs, nor to the application of the invention to the culture of hard land. After passing a sufficient time on the moss to witness the exhibition of the ploughs, and the various other functions and properties of the machine, the party expressed to Mr Heathcoat the extreme pleasure they had received, and their earnest hope that he would extend the sphere of his exertions by applying the invention to the culture of stiff clay soils; and more especially to carry into effect those important operations of subsoil ploughing and improved drainage recently introduced to the agricultural world by Mr Smith of Deanston. To effect these processes, great power is essential, and it was evident that Mr Heathcoat's invention was equally well adapted to them, and would be attended with results no less important than those which will arise from its application to the reclamation and culture of bogs."

It may be interesting to our readers to give a brief description of Mr Heathcoat's patents for his invention of "new or improved methods of draining and cultivating land; and new and improved machinery and apparatus applicable thereto—which machinery and apparatus may be applied to divers other useful purposes."

"These patents were obtained for England, Scotland, and Ireland in 1833. Prolonged and costly experiments have been required to mature the invention, and adapt it to practical use as a substitute for animal labour in many expensive agricultural processes, particularly in the culture of wet, heavy soils. Its first application has been made to the reclamation of bogs, which of all descriptions of soil offer perhaps the greatest natural obstacles to improvement by mechanical means. These obstacles are, however, effectually overcome. Various machinery, constructed expressly for the cultivation of bogs, has, for some months, been practically and successfully worked in Lancashire on a bog called *Red Moss*, near Bolton-le-Moors. The principal machine is locomotive, and is so contrived as to be capable of travelling on the surface of bogs, the consistence of which would be insufficient, previous to a long and expensive drainage, for sustaining the weight of horses. The moving power is steam, generated from the peat and water of the bog itself. The diggings from the drains furnish abundance of fuel; and the drains yield an unfailing supply of water. The prime agent, steam, is thus obtained at the cheapest possible rate; the local fuel requiring no transport, and the water no outlay in reservoirs or other constructions, to ensure a constant provision. By far the

greater part of the power of the engines fixed on the machine is available, and employed to actuate the ploughs or other agricultural implements. These are moved at right angles to the line of progress of the machine, not dragged after it; the machine itself remaining stationary whilst the ploughs are at work between it, and two small auxiliary carriages, in the manner to be presently described. In commencing the reclamation of a bog, a roadway is to be first traced out in a suitable direction for the proposed operations. This is done simply by forming two drains parallel with each other, and about seven yards apart. The principal machine is launched on this roadway. No metal or material of any sort is necessary for its solidity; the machine rests on the raw bog, and bears on so large a surface of it that its buoyancy is insured. It also consolidates and dries the roadway by its pressure. The two auxiliary carriages are stationed (where space permits) at a distance of about 480 yards asunder; one on each side of the principal machine, and parallel with it. Each carriage is furnished with a large wheel, or pulley, round which a band passes, proceeding from, and returning to, the principal machine, whence it derives its motion by proper apparatus. These bands are connected with the ploughs, or other agricultural implements, which are drawn to and fro between the machine and the auxiliaries. One quarter of a mile of land in breadth, exclusive of the roadway and headlands, is thus operated upon on the two sides of the machine. The auxiliary carriages travel on four wheels, resting on planks, which form a moveable railroad. One of the planks is let into a shallow trench cut in the bog, against one side of which plank some friction rollers, fixed on the carriage, press in order to resist the pull of the engines. Ploughing is the first agricultural operation. To accomplish this process in a thoroughly mechanical manner, and to adapt it to steam power, it has been necessary to contrive peculiar ploughs, furnished with sharp working knives, which divide every root and fibre of the bog plants, to the depth of nine inches, and turn over a furrow slice of eighteen inches in breadth, completely reversing the surface, and turning the heather side downwards. The underlying heath, moss, and other bog-herbage facilitates the discharge of water, and permits the rain and air to penetrate the furrows. Drains are formed as the ploughing proceeds, that the vast quantities of water liberated by that process may be immediately carried off. After lying a few months in this state, exposed to the action of the atmosphere, the ploughed surface is found to be so considerably pulverised, that little remains to be done to fit it for the reception of grass-seeds. The complex operations necessary to prepare the soil for the culture of other and more important crops than grasses, will also be materially simplified and economised by awaiting the natural decomposition of the soil, which is so greatly expedited by this system of ploughing as a first process. It establishes a general under-drainage, which, with the assistance of numerous shallow gutters discharging into proper drains, will speedily create a soil on the surface of the wettest bogs. The machine and auxiliaries remain stationary during the time occupied by the ploughs in taking two furrows; they are then, severally, put in motion, and made to advance in three parallel lines, in order to keep pace with the breadth of land turned over, and to pull the ploughs accurately straight. The machine is impelled by the engine, and each auxilli

ary by its attendant man, who also shifts on his planks as occasion requires. The machine and its auxiliaries have thus to be moved over a space of eighteen inches only, whilst the ploughs have travelled 440 yards, and turned over 220 square yards of land nine inches in depth; in other words, the machine and auxiliaries have to be moved only eleven yards, in the time that the ploughs have travelled five and a half miles, and turned over a statute acre of land. The ploughs perform their work at the rate of two miles an hour, and are subject to very few stoppages; so that eight acres and three quarters, nearly, of bog would be ploughed up in a day's work of twelve hours, or, taking the average of daylight throughout the year, and making a liberal allowance for hinderances from weather and other causes, one machine would plough up 2000 acres in a twelvemonth. It is evidently impossible to state, with any approach to accuracy, the expense of draining bogs, as the number, nature, and dimensions of the necessary drains vary with the wetness, retentiveness, and other qualities of each particular bog. The cost of draining will be materially reduced by applying steam-power to suitable draining implements. In like proportion the expense of all other processes in husbandry will be diminished. The power of the engines will be used in conjunction with portable railways, for the conveyance of marl, and other kinds of manure or manuring soils, on the land. By these means, proper times and seasons can be selected for performing the various farming operations, the poaching (or injuring from the treading) of horses will be entirely avoided; open drains, where preferable, may be substituted for covered ones; and no outlay will be required for roads. The land necessarily lost by farm roads and communications between fields will be consequently saved to the occupier and the public, as the machine roadways will be laid down with grass, and thus become permanently productive, instead of being not only a positive loss, but a source of continual expense and trouble."

We now come to give some account of Mr John Upton's steam-plough, noticed in our last paper, and for this purpose we will quote from a prospectus in which that able engineer and mechanist has set forth some of the advantages which he considers the agriculturists will derive from his invention. Mr Upton is at present building a steam-plough, which he expects will be finished in time to enable him to exhibit his capabilities before the prorogation of Parliament. Of late his factory* has been visited by many county members and practical agriculturists (amongst others by Sir Reg. M'Donald, S. Seton, Bart. Hon. Secretary of the Highland Society), who have expressed themselves highly satisfied with the appearance of the machine, its lightness, compactness, strength, and manageableness. Mr Upton has executed with the greatest credit to himself various important public works, and is a practical engineer and me-

* No. 7. New Street, Southwark, London.

chanist of forty-five years' standing. The strongest expectations therefore are entertained that his steam-plough on trial will realize the favourable opinions that are formed of its efficiency.

" This steam-plough is worked by Upton's patent lever steam-engine, and his air furnace boiler. If a single-shared plough, the space occupied by the entire machine will be four feet long by ten feet ; if for trench ploughing, the dimensions will be the same ; if for ploughing two, three, or more parallel furrows at once, then the breadth and length will be about five feet by twelve feet. The work done by the trenching plough will be equal to any spade husbandry ; and that by the parallel shares will be found very superior to any horse ploughing ; inasmuch as the ground will not be trod and rammed down by horses' feet ; and as the stearer or ploughman, &c. will ride on the machine, the land will be left as open and light as possible, and resemble that of garden culture. To the steam-plough a harrow, drill, and seed-box can be attached when requisite, and the entire operation performed at one going, when it is for the last ploughing, without trampling the soil. The spots left in the angles of the field by Upton's steam-plough will be smaller than by any horse-plough, as the steam-plough will turn, if a single share, in three the breadth and length of a common wheelbarrow ; and if a three-shared plough it will turn in the space of a small one-horse cart. The simplicity of construction and small number of parts composing this steam-engine and boiler, and the great safety and security of the latter, will prevent the necessity of frequent or expensive repairs, as the only parts of the apparatus most liable to wear and tear are the ploughshares, the soles, coulter, and harrow tines, which will only require the same repairs as if drawn by horses. The engine and its boiler is calculated to go 50,000 miles, or more, before any repairs could be wanted, unless from accident or unfair usage, and whenever, from long use, very much worn, if the boiler were to burst, it could only extinguish its own fire without injury to any person close to it. The plough will require one steady man to direct or steer it, and a tractable boy to attend the fire and turn the steam off and on occasionally, the engine being of the most simple and efficient construction. The water-tank will require replenishing now and then, and perhaps fuel will be required two or three times in the course of the day, and the boiler is admirably constructed for burning either wood, peat, or coke, or coal may be used. The single plough is calculated to do two acres per day, and as the person will not be fatigued by walking over the rough ground, nor have any horses to rub down and feed after coming home from the field, they could remain out a longer time. The double plough would do four acres, and the three-shared plough would do about six acres per day. The counter or trench plough would do about two acres per day ; but as it would be equal in power to the double-shared plough it would require the same quantity of fuel and expense. The land cultivated by this plough would doubtless be found from its efficiency to produce crops nearly if not quite equal to spade husbandry, with which mode of cultivation I am thoroughly well acquainted from practice ; and it would in such cases pay for the steamer the first season. As to the expense, there would be required one good steady ploughman, who never ought to receive less than 2s. 6d. per day,

and a tractable boy or lad as firemen at 1s. per day, as thus :—One man per day, 2s. 6d. ; one boy, 1s. per day. If coke is used as fuel, I shall state it at the London prices, although in many districts it is much lower, therefore, the single plough would require about twelve bushels per day, which, at 6d., is 6s. Ploughing two acres per day at 4s. 9d. is thus 9s. 6d. Now, it will appear manifest that if two acres can be ploughed per day with a single shared plough for 9s. 6d., six acres per day could be ploughed at a cheaper rate, in proportion, inasmuch as there would only be the same number of people employed as before :—Thus wages per day, as before, 3s. 6d. ; fuel per day, as before, 3s. per acre, 18s. ; ploughing six acres per day, at 3s. 7d., is thus L.1 : 1 : 6. As the ground would not be trodden and rammed by horses or men in the various operations of ploughing, harrowing, sowing, &c. there can be no doubt that superior crops would be obtained, and in some soils deep ploughing is very beneficial, which could be done by steam better than by horses, for steam never tires ; and as for treading the ground it is generally very detrimental, for I have frequently observed that in some soils, wherever a horse's foot hole is left, corn seldom thrives so well, and in many instances in retentive land and cold seasons, perishes. I once had a good field of six acres of wheat entirely ruined and destroyed by a posse of horsemen who lived many miles away from my farm hunting in my fields ; to complain was useless, and as to purchasing law, what farmer or tradesmen can afford to pay for it ?

“ As to the expense of ploughing with horses, there is much variation, some soils requiring only two, some three, and some four, it will be fair therefore to take three as the average number. Now I took great pains to measure and find what was the lowest expense of my horses' keep for three or four succeeding years, and it amounted to twenty pence per day each, which is, I believe, fivepence more than now is allowed for the keep or starvation of a poor old worn out ploughman or his master for one entire week ! Therefore a single team of three horses cost per day (and generally ploughed near an acre) 5s. ; my ploughman received per day, 2s. 6s. ; the driver, 1s. ; in all, 8s. 6d. An acre of land, if ploughed by steam, would cost 3s. 7d. Difference per acre, and better work done, 4s. 11d. Although a good and perfect steam plough may be thought a very desirable machine for the West Indies, Canada, Australia, and the Colonies generally, yet, unless it would do something more than plough and harrow, I thought it would not be approved of, and from my own practice in farming I know what is wanted by a farmer ; and being by profession a steam-engine manufacturer and machinist, think I know, or am more likely to know, and to produce what will answer the farmer's purpose much better than some of those itinerant philosophers, travelling speculators, and *soi-disant* steam-plough makers, who have been to my factory to endeavour to see what I was doing ; but in vain, for I would shew and explain nothing to them. Wishing to produce a machine of the utmost simplicity and general utility, I have so contrived my locomotive engine, that I can detach the ploughs, &c. from it, and send it away to the fold yard, where I will suppose there is a common dung-cart ready loaded for it to take away. My locomotive would take the cart to the field, where the steerer would have to tilt it in the usual manner, and then draw out as much manure to form one

heap as he pleased—to form as many heaps as he pleased, or to tip and shoot the residue, or the whole load at once if required. The steersman would then take back the empty cart at a trotting pace, if he chose, and fetch another loaded one.

“The expense of hauling manure it is requisite to calculate from some given data, in order to ascertain the expense; and having, in the course of many years practice as an engineer, paid as much for the hire of horse and cart work as almost any practical man in this or any other kingdom, besides keeping several good teams of my own, I shall go as near the wind’s eye as I can carry sail, and assume a distance. Say the average distance is $\frac{1}{2}$ of a mile out, and $\frac{1}{2}$ of a mile back, and that the time taken up in tipping the load and exchanging carts would be equal to $\frac{1}{2}$ of a mile more, making 1 mile in time and distance per load. Now, as my teams for years regularly did 20 miles of ground per day, when hauling on the road, and I generally put on 20 loads per acre at a dressing, it would amount to 20 loads or 1 acre per day, at only 2 miles per hour, average time for one team, therefore say,—team per day, 5s.; one man to drive and tip, 2s. 6d.; by horses per day or acre, 7s. 6d. Now my steam-engine, if not very hilly ground, would go at 4 miles per hour, or 40 loads per day, which at the same per day for man, boy, and for fuel, comes to 9s. 6d., the half of which is, per acre 4s. 9d. I shall not notice the filling of carts or spreading the manure, as in either case, whether of steam or horses, the expenses are the same. My locomotive engine would take the carts, &c. loaded with produce to market, at 4 miles or more per hour; and I think it might be so modified by further improvements as to be made subservient to many of the farmer’s wants. It might perhaps be made available for the cutting of roots and fodder for stall-fed and other cattle; for thrashing, winnowing, grinding corn, and pumping water, &c. In case of the last ploughing, when it is intended to sow and harrow in the seed at one going, the same power would effect the whole work, only requiring the aid of the boy, who must otherwise be engaged in driving the harrow horses, but which horse labour and horse injury done to the soil would be done away with, and a further saving per acre effected by my steamer. The additional boy at the steam-harrow would be required to lift up the harrow occasionally, and take up the weeds, and put them in a basket hung to the machine, until arrived at the headland, where a spare cart might be placed to receive them, and which the engine would take out of the field every evening, or as many times per day as was necessary. As to the quantity and quality of work which such a steam-engine would do when compared with animal power; I shall assume a regular breadth for the furrow slice of eight inches, and from four to nine inches deep, according to the tenacity and stony qualities of the soil. At the above breadth, but at less depth, a horse-plough would make as many bouts per acre as would amount to twelve and a half miles, exclusive of ridgings and balks. My steamer would go twice as fast, and being more easily managed and controlled than horses, would not be so liable to get out of line, and would, I think, do the work better, besides not having the fatigue of walking. I shall state what such a steamer would do upon a farm of 200 acres of arable land, premising that it would cultivate a much greater farm where desirable, and leaving the intelligent farmer to calculate the purchase and main-

tenance of the necessary horses, harness, plough gearing, ploughs, harrows, &c.

Ploughing 200 acres per annum once over, at	3s. 7d. per acre.	L.35 16 8
... 150 do., and harrowing again 2d time, do.	...	26 17 6
... 150 do., and harrowing and seeding		
again 3d time, do.	...	26 17 6
... 50 do., fallow 3d time, do.	...	8 19 2
... 60 do., hauling manure 4s. 9d.	...	14 5 0
... 60 days do. to market 6s. 10d.	- -	20 10 0
... 30 do. harvesting (long days) . . 10s.	- -	15 0 0
... 90 half days, equal to 45 days cutting		
fodder, &c. 4s. 8d.	- -	10 10 0
		<hr/>
		L.158 15 10

"I must premise that my preceding calculations both of horse and steam tillage, do not contain the usual incidental expenses of filling carts and spreading manure, inter-furrowing and water-furrowing, draining, weeding, hoeing, &c. : none of which has been incorporated with the ploughing, harrowing, and hauling. Again, my scale of horse expenses is drawn from my own plan of keep, which proved so rational and beneficial to both cattle and owner, that I shall never adopt any other system, which was this :—I knocked down all the racks in my stable, but left the mangers ; I cut clean sweet wheat and barley straw, with equal weights of best sweet hay ; to this I added $\frac{3}{4}$ peck of bean and oatmeal per horse per diem, which was well mixed up, and moistened with water out of a gardening can with a rose-head. I put a small handful of salt for each horse into the mixture, and whenever I could get carrots to chop up small, I added them, and deducted half the bean meal. As soon as the horses came in from work, a very small quantity was spread thin in the manger, and when this was *eat up quite clean*, another lot was put in, *so that there was no waste*—their bellies were soon filled, and they had time to lie down and rest. No man's horses worked harder, and no man's teams were in better condition ; they were occasionally turned out to grass in the meadows on Sundays and during warm nights. This cost me 20d. per day each, the year round, and on this plan I found my calculations of horse keep. I think 200 acres, all arable land, would require 10 horses for tillage, with 4 men and 2 boys per annum, if the land is to be well worked and kept going, besides other hands for occasional works.

Therefore 10 horses kept at 20d. per day each, is	
per annum,	L.303 6 8
Ditto wear and tear of harness and shoeing, per	
annum,	45 16 8
	<hr/>
	L.349 3 4
Four good men and 2 boys, as before,	218 8 0
	<hr/>
	L.567 11 4
Now, by my steamer, the expense of tilling 200	
acres would be, as before stated,	L.158 15 10
	<hr/>
Carry forward,	L.158 15 10 L.567 11 4

Brought forward,		L.158 15 10	L.567 11 4
To which may be added, one additional man and a boy, all the year round, at the same wages as before,		57 5 0	
And one pair of oxen, for furrowing, ridging, and earthing-up, and sundry other purposes, at 20s. per week the pair,		52 0 0	
			268 0 10
Saving in the tillage of 200 acres of arable land, per annum,			L.299 10 0
Say purchase of 10 horses, for 200 acres arable land, at L.25 each, L.250		Purchase of one of my locomotive steam-ploughs, with two shares,	L.350
Do. for harness, plough-gearing, and for ploughs, harrows, &c. 100			
		L.350	L.350

"As to the quantity of land in cultivation, whether by the plough or in grass, much diversity of opinion exists. One author makes his statement for England to be only 11,525,000 acres, which I think is enormously below the truth; another, more than double the quantity in aration alone! but, during the past week, at a meeting in Bath, for a most excellent purpose (*God knows too long delayed*), that of allotting small portions of land to labourers, for spade cultivation, it was there stated by Dr Parry, that England alone contained 29,000,000 of acres of cultivated land; and from all I have read on the subject elsewhere, I think that 22,000,000 of acres may be assumed as the probable quantity under the plough. If we allow the above, for the sake of shewing how steam would benefit the agriculturist, as it has already done the manufacturer, I shall apportion 20 acres of arable land to the labour of each horse as before, with the accompanying number of attendants; then, supposing that a period should ever arrive when all the arable land shall be worked by steam, we shall have as follows, viz. in England:

22,000,000 acres of arable land, tilled by horse labour, at an expense of L.567 : 11 : 4 for 200 acres, which is a fraction above L.2 : 15 : 8 per acre, and amounts to the sum of		L.62,150,000 0 0
The same, if cultivated by the aid of steam, at L.268 : 0 : 10 for 200 acres, would, at L.1, 11s. 9½d. per acre, amount to		34,970,823 0 0

Annual saving to the agriculturists, L.27,179,177 0 0**

That the steam-engine would, at no very distant day, supply the place of animal labour in agriculture, and become as mighty

* Our Scottish agricultural readers will easily perceive that these calculations are founded on the rates of English labour and wages. We are quite satisfied that ploughing in Scotland with horses does not exceed the cost of steam-ploughing as given above, namely, 3s. 7d. per acre; but then the food at present consumed by horses would go to the support of human beings, were inanimate power substituted for animate. Would not such a result be beneficial to a populous country like Great Britain?—EDITOR.

an instrument in augmenting the productiveness of the soils, as it has proved in creating and economizing manufactures, in navigating the ocean, and in travelling on land, was many years ago predicted by Franklin,—a prediction reiterated by Davy, and latterly acknowledged and enforced by many distinguished agriculturists. The successful application of Mr Heathcoat's invention to the culture of bogs,—the most repellant and obstinate of waste land,—leaves no doubt of its applicability to soil already in cultivation. Coals are now procurable throughout Great Britain, at prices which have caused the steam-engine to be extensively introduced as a substitute for animal labour in many of the processes connected with husbandry. Thrashing, cleaning and grinding corn, hay-chopping, turnip-slicing, &c. are now performed by small engines fixed on farm premises, even the churn has its steam-engine managed by the dairy-maid; and so great is the advantage arising to the dairy farmer, from the regularity of motion, and economy produced by it, that hundreds of small engines for this familiar purpose alone, are used in the North of England, and in Scotland. But these are humble savings compared with the benefit to be derived from the vast steam power which may be brought to bear on the soil itself. Those agriculturists who are acquainted with the effects produced by the valuable sub-soil plough recently invented by Mr Smith of Deanston, will readily appreciate the importance of an invention which will enable him to employ that kind of plough at a much diminished cost per acre. Mr Smith's plough, with steam power, will effect a revolution in agriculture. Implements of husbandry have hitherto been restricted in form, weight, and dimensions, to the powers and manageableness of a team of horses. A new class of instruments will take their place; the stiffest soils may be broken up and pulverized to any desired depth; strong clays, the natural wheat lands, may be profitably cultivated, rendered more fertile, and fitted to bear a better, and more systematic rotation of crops.

Such are a few of the benefits which land-owners and agriculturists will derive from the substitution of steam for animal power in husbandry. It is also no slight advantage, in a national point of view, that this important change will be effected, unaccompanied by any of those temporary evils which too fre-

quently attend the application of mechanical discoveries to existing arts. This invention will not displace a single human being from his accustomed healthy occupations ; it will restore to the support of man a considerable portion of that large amount of produce now sacrificed to the maintenance of agricultural horses,—it will furnish employment to the rapidly increasing rural population of the empire, by rescuing millions of acres of bog and waste land from obnoxious sterility,—it will fix on their native soil multitudes of those poor Irish labourers who annually migrate to Great Britain in search of work and food, and who are forced, with numbers of our countrymen, to suffer the hardships and dangers inseparable from emigration to wild and distant regions.

The horses in Great Britain are said to amount to 2,000,000, each consuming annually what would be sufficient to support eight individuals,—16,000,000 in all. Their entire displacement by mechanical means, would, therefore, in effect, be to add another island, large as Great Britain, with all its resources for human sustenance, to the seat of empire ! What an insight does this give us into the indefiniteness of that divine command which was breathed in paradise as a blessing over our race, “Increase and multiply, replenish the earth and subdue it.” Have we subdued the earth ? Can we subdue it ? How does this incentive to rural activity,—the precept of that *Parent of Good* whose intention it is that the mouths of all his children shall be filled with food, and their hearts with gladness,—meet and overthrow the dogmas of those who have said to population and productiveness, “Hitherto shalt thou come, but no further !” Mind shall indeed achieve her noblest triumph, when she shall no longer be confined to accommodating matter for the use and the comfort of man ; but when she shall direct what in reality is a substance impalpable as the breath of heaven, to purposes which shall feed the hungry, clothe the naked, give employment to the idle, and, supplementing the energies of exhausted Britain, shall bid her, in renovated splendour and renewed age, walk on innoxious to that inherent decay which has put down in rotation all the extinct monarchies of the past, and bid her rival for ages to come, in extent of production, upon the petty surface of a

few million acres, the limitless domain of her once western world.

We are happy to observe that the press of Scotland has of late been advocating the advantages to arise from steam husbandry; and we trust the time is not distant when the Highland and Agricultural Society will offer a liberal premium,* *not for an effective steam-plough*, but for the first company for building steam-ploughs and hiring them out to the neighbouring farmers, that shall successfully introduce this new branch of industry into Scotland. If some spirited agriculturists,—for instance, the Marquis of Tweeddale, Lord Greenock, and Mr Menteith of Closeburn,—in their respective neighbourhoods, would patronize the formation of such companies, each to commence with a capital say of L.20,000, steam agriculture would simultaneously and extensively be introduced into the east, south, and west of Scotland. But if this invention were left to private and individual enterprise, in the present depressed condition of our farmers, half a century would elapse before its use would become general. Let our tenantry press this subject upon the attention of their landlords in their respective counties. What a relief in these times it would be, if each farmer, instead of keeping four, six, or more pair of horses, had only to send to the next village for a steam-engine to do the work for which he has to feed and attend them during the year.

As it has always been our impression, that the landed interest has a direct and paramount stake in preserving the intercourse of the country upon the present turnpike roads, in contradistinction to the railway system, which is an attempt on the part of the monied interest to monopolize the whole of our internal conveyance, it affords us gratification to be able to report, that a bill has this session passed the Commons, and is now (August 1836), in favourable progress through the Lords, “to repeal such portions of all acts as impose prohibitory tolls on steam-carriages, and to substitute other tolls on an equitable footing with horse-carriages.”† Our readers will possibly recollect, that

* The Society has placed L. 500 in the hands of the Directors, to be appropriated to this purpose in the manner they may conceive most likely to secure the object in view.—**EDITOR.**

† We observe that the Select Committee of the House of Lords have
VOL. VII.—NO. XXXIV.

it was the passing, in 1831, of several hastily considered road bills, (some of them imposing tolls to the extent of *L.2 per trip*), which stopped Mr Gurney's steam-carriages after they had run daily for four months between Cheltenham and Gloucester, and had conveyed upwards of 4000 passengers without accident of any kind. The passing of this bill, and the strong encouragement which the landed interest ought to give to *this mode* of mechanical locomotion, will, we trust, shortly lead to the introduction of steam-carriages on the great thoroughfares of the kingdom; and as the Chancellor of the Exchequer has obtained leave to bring in a bill next session for the better regulation of the post-office, we are still in hopes that the propriety of *consolidating the conveyance of letters, persons, and parcels, and making it a new source of revenue to the State*, will force itself upon the attention of the Legislature; especially as the extension of the railway monopoly system must ultimately be attended with ruinous consequences to the agriculture of the kingdom. As we have brought our views upon this vital subject fully before the public in the 28th Number of this Journal, we shall not do more than advert to it in this paper. Would to God that every man who loves the soil of his nativity, and those who cultivate the same, would read, mark, learn, inwardly digest, and practically support, the policy which is therein propounded.

This last session has been an eventful one for the British farmer. After twenty years of continuous suffering, and the subject had several times been recommended to the attention of the Legislature in speeches from the throne, two parliamentary committees, one of the Lords and one of the Commons, have investigated the causes and extent of agricultural distress, without either of them making a report on the same! When it is considered that these committees were appointed by the Government, is it unfair to infer from such a result of an inquiry involving the peace and prosperity of the nation, that the recent declaration made in his place in Parliament by one of the members for Middlesex, and which was heard by the occupiers of

recommended in their report, which was presented by the Duke of Richmond, that this bill be withdrawn for the present; but, at the same time, they condemned the imposition of prohibitory tolls against steam-carriages in local acts.—EDITOR.

the Treasury Benches without repudiation, viz. that "*The people might well dispense with the landed interest ; and that if England never grew a single bushel of wheat, barley, or oats, she might still be quite as great a country as she is at present,*" is in reality the opinion of the existing administration? The policy, however, under which the agriculturists now languish and perish will shortly come to its close. The silence of the agricultural committees speaks louder than would a thousand reports. It will be the signal for that common co-operation on the part of land-owners, land-occupiers, and land-cultivators, which will convert the cry "*Justice to British Agriculture*" into a principle which will ultimately work out a happier state of social existence than any which has as yet blessed our fallen condition. Great changes cannot be effected without great combinations ; these we have had of late abundantly for evil,—why should we not have them also for good? Can the staff of life be broken in the land and the nation perish not? No. "*Out of the ground from which we are sprung* (and not out of our neighbours) *shall we* (whether collectively or individually) *eat bread even until we return to it again.*" A packed agricultural committee of that House, which the farmers of Suffolk, last year, at the Ipswich Lamb Fair, justly denounced as being utterly unworthy of the confidence of the country, may withhold a report ; but the distress of the farmers of England cannot be shelved with the evidence which proves it to be of a more alarming and exigent character, to use the words of Lord Wynford, "*than what it was represented to be in any of the petitions on the subject presented to Parliament.*" They have only, therefore, to bear their burden for a short while longer ;—a defective harvest, which this promises to be, with an opening of the ports, and all rent, all tithe, all taxes, and all poor rates will cease to be paid.

There is just one method by which the revolution that impends over the country can be averted. It is by a union of the agricultural and industrious classes to rescue the government of the country out of the hands of the monied interest. The productive orders, by whatever name or occupation they may be called, have a common interest in shaking off the domination of the Jews, political economists, depopulators, who, during twenty years of peace, have done more to destroy the

prosperity of Britain than what was effected through the long period when banded Europe was at her gate in arms. A long pull, a strong pull, and a pull altogether on the part of those by whom the nation is nourished and clothed, and all would yet be well. There is no lack of *power* in the country to render all classes of our people happy, industrious, and contented; there is only a lack of *will* in those rulers, both Tory and Whig, who have hitherto sacrificed the *many* to benefit the *few*. It is only a couple of months since, at a public meeting at Bath, Mr Roebuck had the hardihood to declare, that he and his tail were prepared to take the government of the country into their own hands. We should be glad to see some leader arise who, on the part, in the name, and for the behoof of, the great and stable *producing interest* of the kingdom, shall assert its right to take the government of the country into his hands. It is not a political partizan that we want, but some man, whether Whig, Tory, or *hybrid*, who shall lay his hand on the plough, the sail, and the loom, and in the united power of the agricultural and industrial interest of England, Scotland, and Ireland, bid them prosper. Some man who, superseding *political* by *social* reform, shall repeal the malt-tax,—change the system of monopolizing and accumulating wealth,—expand the currency,—adjust taxation,—reduce the National Debt,—foster native industry,—develop ingenuity,—promote new inventions,—extend improvement, and carry out to its farthest limits the farmer's maxim—“*Live and let live.*”

In furtherance of these objects, we are happy to say that since the date of our last, “The Central Agricultural Society of Great Britain and Ireland” has been founded in the metropolis. The objects of this great and powerful association, of which His Grace the Duke of Newcastle is President, and which already enrolls as members sixty-four local societies, are twofold, the *protection* of agriculture and the *encouragement* of agriculture, *i. e.*, the removal of every obstacle, whether legislative or physical, that affects the cultivation of the soil. Its general committee is formed of such peers and county members as belong to the society, of the presidents and secretaries of the subscribing local agricultural associations, and of two deputies from each, in addition to whom is an acting *electd* committee of forty members and the officers of the society, in all amounting to 272.

The Central Agricultural Society is composed of men of all shades of opinion, and is wholly divested of *party* political objects. We augur the happiest results from its formation. It will be a bond of union and strength to the agricultural interest; and as the *terminus ad quem* of all its proceedings will be the extinction of pauperism, it is to be hoped that it will meet with the support of the public at large. In the death of the Duke of Gordon, the Central Agricultural Society has to lament the loss of one of its noblest members connected with Scotland,—but it enrolls the Perthshire, the West Lothian, and the East Fife Associations. Their example will, we hope, lead to the adhesion of other Scottish societies. The farmers of England, Scotland, and Ireland must cultivate closer relations. “*Vis unita fortior*” must be their motto, if they would avert ruin,—total ruin.

R. B.

ON A SAFE METHOD OF FEEDING CATTLE WITH POTATOES.

THE feeding of cattle with potatoes alone has ever been considered a dangerous practice. Many cattle have fallen victims to the flatulency arising from fermentation of potatoes in the paunch. Any plan, therefore, which can prevent this danger, is worthy of consideration. I have fallen upon one which I think completely averts the danger. I write from Ireland, and the practice about to be related is peculiarly adapted to the numerous small farms in this country, as well as those of a larger scope in Scotland.—Cut a stone of potatoes into pieces smaller than walnuts, and mix them minutely with a bushel of cut straw, for one feed for one beast. The potatoes may be cut either with a spade or with a turnip-cutter, or by any other means which may effect the purpose. If a spade is used, which is the most expeditious method, its blade should be made fifteen inches in length, and bent into the shape of the letter S. The potatoes are placed in the bottom of a tub, whose diameter should be as large as to admit each potato of the stone of potatoes to stand singly, or nearly so, that every stroke of the spade may reach the bottom of the tub. The reason for cutting the potatoes so very small, is that, being intimately mixed with the cut straw, the straw becomes damped with the potato-juice, and the cattle eat the mixture with

the greater relish ; and the advantage derived from the minute mixture is, that the straw completely prevents the fermentation of the potatoes in the paunch from injuring the cattle. They eat up the prepared mess with relish, are soon satiated, and then lie down with ease and comfort, and of course fatten rapidly.

For a cow in calf, and not yielding milk, or for young cattle that are intended to be kept only in a growing condition, two stones of minced potatoes, in two bushels of cut straw, each day, with straw fodder, will suffice. That quantity is at least equivalent to the ordinary quantity of turnips which is given to cattle in a similar situation. A short-horn ox, intended to be fed, of the weight of 40 or 50 stones, would require five stones of minced potatoes, and five bushels of cut straw, each day.

In regard to the cost of feeding cattle by this method, I may mention, from experience, that a bushel of straw can be cut, with one of Mr Slight's straw-cutters, as described in this Journal, for one farthing ; and, taking the value of potatoes as it usually occurs in Ireland, in the early part of the season, at from 9d. to 1s. per cwt., an ox might be kept on, at the highest price, for 3d., or fed off for 7½d. per day.

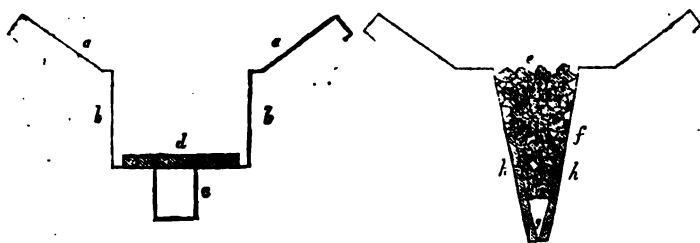
In conclusion, I may relate a method which I practise of conveying turnips from the field to the homestead. Through the middle of the small farm which I have, runs a ditch, in which a large quantity of water flows almost all winter. On pulling the turnips in the fields adjoining this ditch, I cause them to be carried on hand-barrows, and tumbled into the water of the ditch, which conveys them down speedily and well washed to a convenient place at the steading ; thus saving the labour of cartage, and the poaching of naturally heavy soil in winter by carts and horses.

A. A.

ON AN ECONOMICAL MODE OF FURROW-DRAINING.

EVERY attempt at the introduction of economy in farming operations, if founded on practice, deserves commendation. On this ground, the following economical mode of making furrow-drains claims especial attention from those whose locality affords flat stones.

Suppose a piece of land containing two ridges, of 15 feet each, one whole ridge and two half ridges, divided by two furrows. The drain is made in this manner:—Gather up the ridges with a four-horse plough, to make these furrows wide and deep. If gathered from lea, a crop may be taken the year previous to the commencement of the drainage. This ploughing leaves the furrows 16 inches wide at the bottom, and if the furrow-slice *aa*, fig. 1, on each side, has been ploughed one foot deep, and laid over at an angle of 45 degrees, their tops will be 32 inches apart. A line stretched from the crown of one ridge to that of another, will give the depth of the ploughed furrows 22 inches below the crowns of the ridges. This ploughing is only a preparation for the ultimate making of the drain. The drain is then made in this manner, on strong clay soils, which alone can resist the abrading effects of running water.—Leave a scarcement of one inch on each side of the bottom of the furrow left by the plough. Cut out the earth 14 inches wide, perpendicularly, with the common spade, 10 inches in depth, *bb*. Then throw out the bottom of the drain with a narrow-pointed spade, 5 inches more in depth, *c*, and 4 inches in width, leaving a scarcement of 5 inches on each side of the spade; and the cutting of the drain, whose bottom is now 37 inches below the crowns of the ridges, is then completed. The drain thus made is filled in this way:—Take thin stones, such as strong grey slates, or thin flags, and place them upon the 5-inch scarcements left by the narrow spade, as *d*; they need not be dressed at the joints, for one stone can be made to overlap the ends of two others. They form the top of the conduit through which the water in the drain flows under them. The drain then may be filled up in the usual manner, with the plough and spade. The expense of making this kind of drain is, for spade-work, 6d. per rood of 36 yards in length. A Scotch acre contains 32 roods of furrow, at 15 feet apart, which gives 16s. for spade-work; 12 tons of flags, of an inch thick, will cover the 32 roods, which, at 4d. per ton, is 4s. more,—in all 20s. per Scotch acre, including the laying of the flags, which is estimated in valuing the spade-work. Fig. 1. will give an idea of this drain, after the above description.



The drain represented in fig. 2. is thus made, and it is applicable to every species of soil. After ploughing the furrow, as already described, the spade takes out a trench from the bottom of the ploughed furrow, 8 inches wide at *e*, 16 inches deep, *f*, and 3 inches wide at the bottom *g*. The depth will thus be 38 inches below the crowns of the ridges. This drain is filled with flags *h h*, set on edge, meeting at the bottom of the drain, reclining against the sides, and kept asunder by a stone of any shape, acting like a wedge between the flags, as represented in the figure. The remainder of the drain is filled with riddled stones, the riddlings being kept on the top, and covered with any matter, and then earthed over with plough and spade, like any other drain. The expense of the spade-work is about the same as of fig. 1; the stone-work will of course be more, but how much more has not been so accurately ascertained as to be confidently given to the public. Even at L. 2 per Scotch acre, this would be a substantial and cheap method of furrow-draining.

T. S.

ON MAKING DRAINING TILES OF PEAT.

AN ingenious spade has lately been invented by Mr Hugh Calderwood, Blackbyres, Kenwick, Ayrshire, for cutting draining tiles of peat. The instrument is worked very easily, and forms the tile with one cut of the spade; the tiles being cut *one out of the other* expeditiously, and without waste of material. Their shape is something like clay tiles, but more massy. They are dried in the sun during summer, lying flat on the ground, and may be stacked like peats, ready for use when required. When properly dried and hardened, wetness will not soften or decompose them. Peats are frequently found in

mosses which have been buried long ago by accident, still hard and fresh ; and those that have been used for draining upwards of thirty years ago, have been taken out of the drains unimpaired and solid. It has even been asserted, that a well dried peat has been boiled for six months in a boiler at Catrine Cotton-works, which was taken out after that period solid and uninjured. There is no doubt, however, of the capability of dried peat to resist moisture. The large stacks of peat formed for the use of families in Ireland, where coal is unuseable or scarce, are never thatched. The invention of this spade tends to render the draining of moorish lands more practicable than hitherto, as with it a farmer may cast two or three thousand tiles a day, within a very short distance of the ground he intends to drain, at one-fourth or one-fifth less expense than he could furnish himself with the same number of clay tiles ; the frequent want of clay in such districts rendering the manufacture of clay tiles at hand impossible ; and the cartage of them from the kiln to a great distance to the land is at all times an expensive operation. When laid in the trench, the peat tiles are placed with their grooved faces opposite each other, one of them serving as a sole, as in the figure. We understand that a considerable number of Calderwood's spades have been working this season in Ayrshire ; and if experience prove their utility, they will no doubt get into general use in peaty districts. Specimens of the tiles and spade have been lodged in the museum of those enterprising friends of agriculture, Messrs Drummond, Stirling, and we believe they may also be seen in the hands of Messrs Samson and Company, seedsmen, Kilmarnock.



ON CROSSING BREEDS OF CATTLE.

By Mr JAMES DICKSON, Cattle-Dealer, Edinburgh.

THE chief object of breeding cattle is the acquisition of profit. The raising of them is an art ; and, like all the other arts, it is attended with labour of mind and body. The purchasing of breeding stock at the outset, and of collecting them together from different breeding districts, to one farm ; of rearing

the young stock from the period of their birth to maturity ; and of disposing the surplus stock at markets, is a labour attended with considerable outlay of capital and exertion of body and mind, and no one unacquainted with all the minute details necessary to be observed in the breeding and rearing of cattle can conceive the peculiar labour of conducting this department of farm management. But the anxiety of the mind is protracted beyond the labour of the body, partly from the uncertainty whether the progeny of the purchased parents may turn out to expectation, and whether the return from the outlay of a considerable sum for at least two or three years may be equivalent to the risk, and partly from daily solicitude accompanying the progress of the young stock towards maturity, whether awakened by the risk of death or the apprehension of receiving a remunerating price for stock, upon which the breeder is conscious he has bestowed every care and attention to bring them to perfection. Were it not that the anticipation of success inspires him with hope, no man would undertake the toil of rearing live stock ; but the assurance that his efforts will place a fine stock in his possession if he pursue a proper course of breeding, and which will remunerate him in the end, supports and encourages him to perseverance. If this assurance is well founded, which I maintain it is, the profit of the breeder will be greater or less according to the means which the breeder employs in obtaining it. If he cultivate ordinary stock, that which may come first to his hand, his profit will certainly be small, for no breeder has a right to expect great remuneration who gives himself little trouble in rearing his stock. If, on the contrary, he select his breeding stock with care and judgment, he will certainly be recompensed for his trouble. Whether, therefore, the breeder derives a larger or smaller profit from his stock depends on his own exertions. But the breeder must not only use exertion, it is obviously his interest to secure the largest profit with the least labour. In aiming at this high accomplishment, he must select his breeding stock by which it is to be secured with much discrimination. The materials are always within his reach, he must select them with judgment. There is great difficulty, it is true, in choosing properly, but he will prove himself the most successful breeder who can select with the most correct judgment. A

thorough knowledge of rearing stock is a pre-requisite, and it can only be acquired by observing, in the first instance, the operations of other breeders, and being familiarised in it by studying the nature of all the domesticated animals.

These are the principles which should guide the breeder in the rearing and cultivation of his stock. The adoption of an opposite procedure will inevitably lead him to disappointment and failure, because, being opposed to common sense, and the method which Nature adopts in regulating the increase of the animal creation, it must necessarily fail. The practice of the experienced man is a tolerably safe guide in regulating that of a beginner; but were he merely to imitate the practice of man, his own could never rise above the standard followed. Now, Nature is a superior teacher to man, and she never fails in her object. The fruits, and flowers, and animals of her creation, are the most perfect of their kind. To follow her practice, therefore, is true wisdom. Now, the progressive variety of the domesticated animals shows that their condition may be improved, whilst their kind is preserved pure. The state and kind of wild animals is always uniform, but that of the domesticated varies, and yet the kind of the latter is always as fixed as that of the wild animals. What, then, constitutes the whole difference between the wild and domesticated animals is, that the former remains unchanged in every respect, whilst the latter remains unchanged in that respect which preserves their distinctive characters, and yet their condition may vary, to suit the wants and tastes of man.*

* The uniform external characters and habits of wild animals, the tendency to deviation in the external characters and habits of domesticated animals, and the failure which has attended every attempt to *domesticate* any wild animal, are circumstances which have led some to the belief that the races of domesticated animals were never wild. I confess I am strongly inclined to adopt this opinion. In the first place, I see no evidence of a greater number of kinds of domesticated animals now in the world, than have been from the earliest period of history; and, in the next place, there have always existed as many kinds of domesticated animals as have been useful to man in his most civilized state. As the civilization of man increased, so have the variety and quality of domesticated animals increased, but the number of their kinds have not increased. There were horses, asses, camels, dogs, cattle, sheep and goats, in the days of Abraham, as well as now, and these constitute the largest proportion of our domesticated animals. Many attempts have

The securing of the greatest profit in breeding with the least labour, consists in procuring that breed which will attain the greatest weight and maturity in the shortest time, and on the least quantity of food. On observing the progress of different individuals of the same breed of cattle, every breeder may have noticed that some individuals fatten quicker than others under the same treatment ; and were the cattle of different breeds, the difference in the progress of fatness would probably be the more striking. Results so obvious cannot fail to rouse the inquiries of the breeder. How is it that animals of different breeds, or individuals of the same breed, fatten faster than others ? They all receive the same attention and care, food and comfort. On inspecting the subject more closely, the breeder discovers that those animals which improve fastest, are the most beautiful to appearance, and most handsomely formed. Out of regard for them, he has a desire to handle and fondle them, when he makes a new discovery. He finds that their skins feel agreeable to the touch, are loose, and easily laid hold of. Their bodies are soft and fat, and he can press his fingers into their flesh, which springs back again in an elastic manner. He can also ascertain the same properties in the parents of the respective cattle which have thus exhibited them, and when he has made this observation, he has made another discovery. He thereby learns, that cattle pos-

been successfully made to tame single individuals of wild races, but such animals, though tamed, are in quite a different state from our domesticated animals. Some wild animals exhibit a great degree of familiarity. The swallow builds her nest in our windows, and the robin enters our dwellings; whilst the blackbird and sparrow are constantly before us. This familiarity, however, does not amount even to tameness, far less to domestication. It appears to me, that wild animals are preserved unchanged, for the great purposes of providence throughout the globe, and that Nature has presented to man only such animals as are obviously most suitable to his wants. With these he must be satisfied. What wild creature would we desire to substitute for any one of the domesticated animals ? Should we desire it, Nature has placed such a barrier in our way, that it is impossible for us to make a single wild creature available to our domestic purposes. We may exercise our ingenuity, judgment, and even caprice, in moulding the habits and qualities of domesticated animals to our tastes, wants, and conveniences. There the field of experiment is open to us, not to an unlimited, but to a great extent ; but Nature will not permit us to make a single predatory incursion among her wild animals. She "careth for them" in an especial manner.

sessing certain good and useful properties, have the power of imparting them to their progeny. He becomes convinced that good properties are hereditary, and, by a parity of reasoning and observation, he concludes that bad properties are also hereditary. He therefore retains the breeding stock which possesses the good properties, and disposes of the rest which possesses the bad, and fills up their place with animals possessing properties similar to the first. His mind having thus been awakened to the proper course to be pursued in breeding, he perseveres in the selection of the best animals, and, in the course of time, his experience and taste correct the defects which may exist in even the minuter properties of his animals. Some of these minute defects may not exhibit themselves for some time, even for years ; but when they do appear, the animals having them are removed, and those only cherished which have preserved all the good properties to the latest period.

Having thus procured that breed which attains the greatest weight and maturity in the shortest time, and on the least quantity of food, not absolutely, but relatively to other breeds (for it is perhaps not in the power of man to fashion an absolutely perfect breed of cattle, which these qualifications would indicate), the breeder's next consideration is how he is to preserve the good properties which have been acquired in his cattle. This consideration will be early impressed upon him, for he knows that the possession of any good thing is but a fleeting acquisition ; for he sees that others more than he cannot retain a good thing permanently, for every thing becomes the more evanescent the purer it is. He finds this to be true in regard to cattle. The good properties gradually disappear, one after another. The more minute properties disappear first, as it were stealthily, before he is aware of their disappearance. He finds, to his amazement and embarrassment, that his cattle are undergoing an evident change for the worse. They are becoming smaller, they are more tender, more easily hurt by change of food and weather ; they shew symptoms of internal disease, and some even die in spite of his attempts to preserve them. He becomes alarmed, he ascribes the change perhaps to some temporary change in the atmosphere, to some epidemic, which will pass away with the season ; and, at all events, he cannot ascribe to mismanagement

on his part, as a cause of the disheartening change. He is not conscious of having deviated from the exact line of conduct which has hitherto led him to prosperity and fame. He finds himself in a dilemma. If he continues as he has latterly proceeded in his method of breeding, he fears that the value of the cattle, upon which he has bestowed so much care, and of whose beautiful appearance he is justly proud, will decline every year. It is no easy matter for a breeder to extricate himself out of such a difficulty. The many conjectures which he forms to account for the unfortunate change, the epidemic among the rest, have now lost his confidence, and he begins to distrust his later management, and attempts to discover an error of judgment or of practice. But although an error of judgment or of practice had produced the effects, its immediate connexion with them may not be very apparent; and, at all events, he is reluctant to acknowledge that it is easy to account for so great a change as has taken place in his stock. He cannot conceive that a pursuance of the same plan which has perfected his animals, can at any time be detrimental to them. He resolves, however, to proceed in future with circumspection. The first precaution which he uses, is to change his breeding stock, in that line whose progeny have shewn the greatest change. He purchases a bull from the best breeder in the country. This is at least a safe step. On comparison, his eyes are opened to the lamentable fact, that his present favourite bull, which has procured him his stock, is not so perfect as other people's, nor what he has before had: he is fat enough, but seems bound together, and is small. He resolves that he shall serve no more of his own cows, but he puts him to a cow which he has bought, in order to mark the results of the double change which he is about to effect by introducing a fresh bull and a fresh cow into his stock. The results prove better than his expectations. He tried the experiments in doubt, but he exults in the results, because he is in the way of regaining his lost stock. The fresh breed exhibits the size, strength, hardiness, all the good qualities of his best animals. He now sees the necessity of changing, at intervals, the blood in breeding cattle, in order to maintain them in that high and palmy state, which imparts the greatest pleasure and profit to the breeder. He is convinced that without a change of blood in its

constitution, or, in other words, without *crossing*, no breed of cattle can maintain its health and usefulness.

Convinced though he be of this position in regard to crossing in the same breed, still he naturally asks himself, Will any kind of crossing produce similarly favourable results? Were any bull or cow used, would their progeny be as perfect as that of the crosses which he has just tried? No reasoning can satisfy any man in the matter; experiment alone must answer those questions. But having already made experiments and succeeded, he may try others. He buys a bull of any breed different from his own. He puts him to one of his best cows. The result proves almost a failure. The progeny is no doubt strong and hardy, but it is coarse, and by no means an improvement on his own breed. Such an experiment shews him that he should not rely for improvement in a confessedly inferior bull. He then finds, that the crossing of breeds must not be conducted in an indiscriminate manner, that a superior bull is necessary, and that a superior cow cannot secure him against disappointment when coupled with an inferior bull.

He will try another experiment, the converse of the last. He now buys a cow of a different breed from his own, and puts his best bull to her. The result is much superior to the last experiment. The progeny is not so fine as his own pure breed, but it is superior to its mother. It proves a rapid grower, kind feeder, has a good figure, and hardy constitution. He is encouraged to proceed a little farther. He puts a *fine bull* to a *cow of this cross*. He is still not disappointed; the progeny is still not so fine as his own pure breed, but it approaches nearer in similarity to it than the first cross; and proceeding *in this manner* for generations, he ultimately finds that the *coarse breed merges into his own*. As he is still in the field of experiment, he tries the effect of a bull of a different breed from his own with a cow which is a cross between a coarse cow and a fine bull of his own. Instead of the cross improving as it did with the fine bull, it is decidedly worse than its sire. He receives no encouragement to proceed in this direction. These latter experiments prove to him, that, were it possible, from the course of events, that no superior cow could be obtained, a superior bull would in time raise a stock similar to himself from a cow of a

different breed ; and that this cross should either remain as it is, because it is certainly a good cross, or it will merge, by means of a superior bull, into his own pure breed ; but that by an inferior bull the cross degenerates at once.

I have thus endeavoured to trace, by the supposititious case of a breeder, the natural progress of breeding ; and I have farther carried the supposition to the extent that the same breeder had experienced all the changes incidental towards the acquirement of a perfect breed, in order not to break the regular and necessary connexion in the progress towards perfection. This supposition has served to simplify the description of the proper process of breeding ; but it must not be taken for granted, that breeding up to the attainment of a perfect breed is really a simple matter. It is only possible for any man in a long lifetime to acquire all the experience which the above supposition exhibits. One man's experience is generally limited to a few circumstances ; but he must observe the operations of others, and profit by them as well as his own. In this manner, the results of the experience of many breeders are introduced into the above supposition. It is therefore not imaginative, but a view of the actual progress of particular breeds. For instance, the breed which is represented as having been brought to the highest degree of perfection, is the short-horned ; and its degeneracy is indicated by pursuing the breeding too near akin. Its recovery is ascribed to an intermixture of the same kind of blood, derived from a different source ; and this process is recommended to be occasionally resorted to, in order to preserve the tone of breeding in vigour. Hence crossing is recommended to preserve the purity of blood ; because this intermixture of the same bloods is nothing more nor less than crossing ; but crossing of any kind must be conducted on judicious principles, and not at random. It will not conduce to improvement to cross a fine short-horn cow with a bull of inferior breed ; for we have seen by the supposition, that the progeny could only be superior to the male, but inferior to the female parent. On the other hand, a short-horn bull will improve the progeny of any other breed. Why that should be the case, it is impossible to explain. It probably arises from the high tone of blood which the short-horns possess ;

but how this high tone of blood in them operates as an improver of the qualities of other cattle, I pretend not to explain. The explanation must be left to physiologists. It is sufficient for all practical purposes, that the case is as I have stated ; for knowing the fact, the breeder possesses all that is requisite for the improvement of any breed in the country. This property of the short-horn bull I conceive to be an invaluable one, as we shall have occasion to see in the sequel.

MISCELLANEOUS NOTICES.

I. Agricultural Colleges.—We have been much interested by an intelligent communication from a correspondent in one of the French commercial papers, who, after mentioning cursorily the different countries in which agriculture is more or less attended to, and pointing out the consequent benefits resulting to the peasantry, as the means of improving their comforts, and diminishing their poverty, strenuously recommends the formation of agricultural societies in France, praising at the same time in the strongest terms the system of agriculture adopted in Great Britain, and the high and deserving patronage with which it is favoured. He then arrives at the point of argument which we acknowledge struck us as well deserving deep attention, the benefits likely to accrue to France from the establishment of Agricultural Colleges for the practical education of young men destined to become agriculturists, on the same principle as that founded by the Empress Catharine at St Petersburg, where the students are both practically and theoretically made acquainted with the art of agriculture, having a portion of ground allotted for the experimental part of their study, being provided with ploughs and other agricultural implements. They also receive lectures on Geology and Chemistry, and are instructed in the manures most beneficial for particular soils, to which it might be suggested, that a branch of the tuition should consist of the management of cattle, and improvement in their breed. At Moscow a college has been also instituted by the Emperor Alexander, for instruction in the same science. In Prussia agriculture meets the direct patronage of royalty ; and the Royal Academy of Agriculture near Frankfort-on-Oder, superintended by one of the most practical as well as scientific men in Europe, M. Thaer, proprietor of the well known estate called *Moglin*, is too celebrated to need any eulogism. From parity of reasoning, we would infer, that the institution of such colleges in the United Kingdom might be highly beneficial to the rising generation of British farmers, rendering the sons of the larger landed proprietors, from their practical knowledge, competent to undertake the management of their own estates, or, at all events, would qualify them to ascertain that their bailiffs adopted the best mode of cultivation, to insure improvement of the soil, and consequently an increase of produce. Thus all the drudgery and labour of following the plough in the field, or going through the irksome detail at a more advanced age, would be avoided ; and the young agriculturist

would leave his college practically as well as theoretically informed as to the treatment and tillage of the land. By a scientific arrangement of this nature, an experimental emulation would be created on the part of students leaving college; and by attempting various theories on their own or fathers' farms, the fertility of Great Britain might be considerably improved, and a decided as well as general impetus given to cultivation throughout the country. Until the operations of the animal, vegetable, and mineral kingdoms are more thoroughly explored by farmers, there is little chance of any extensive augmentation in the produce of the country. Investigating the nature of the soils, and using various manures to create or destroy component parts, that may be beneficial or detrimental in forwarding vegetation, is an essential knowledge and study on the part of a farmer. In many of the English counties, certain manures and systems are adopted from ancient prejudice or ignorance, the fact of the seed germinating and yielding a return being thought sufficient proof of the efficacy of the favoured mode of tillage; and it would be quite unavailing to attempt any alteration or experiment deviating from the antiquated system. Whereas, by a more judicious treatment of the land, and an improved method of agriculture, the farmer applying studiously to ascertain the manures most conducive to different soils, the earth might be forced to increase its produce several fold. The principle is at present, however, we fear, for the most part theoretical; for, allowing the embryo power of extra fertility in the land, yet the number of agriculturists in England will be found extremely limited who would be inclined to enter into an experimental system of cultivation. Instances, of course, can be adduced of education surmounting prejudice; but the present race of small farmers, whose fathers have reared their crops by specified plans of agriculture, are scrupulously followed by their sons, and until by a different mode of education you can convince the cultivator of the efficacy of a new system, the reasoning faculties must be more enlarged and enlightened than can be expected in the present generation; but the institution of "*Agricultural Colleges*" would afford the readiest and at the same time the most effectual means of promoting so desirable a result. What has caused the Scotch farmer to become an experimentalist, and to make the advances and improvements in agriculture which he has made, but the more general diffusion of an improved education?

—W. G. FEARNSIDE.

II. *French and English Rural Comforts.*—*Nantes.* Passed through a productive country, in which the cows seemed the legitimate proprietors, the peasantry interlopers. The fields were luxuriant, but all that betokened the presence of man was deplorable. "Heaven made the country but man made the town," is the poet's mode of accounting for narrow streets. But the general order of French towns do not come within the category of human building. Nothing on earth approaches nearer to the troglodyte style. Nineteenths of them seem to have been the simple work of nature; piles of mire shaped and pared into habitations by the hand of time and tempest, and as guiltless of glass windows, whitewash, or comfort of any conceivable kind, as a cavern in the back of an American wilderness. But the Frenchman is a genuine "Galleo" in private life, and "careth for none of these things." Yet he is within fifteen miles of a people whose study is every thing of do-

mestic convenience. To what can the extraordinary difference be attributed, which makes the man of England and of France as essentially antipodians, as if the diameter of the earth divided them? It cannot be climate, for in three-fourths of France they have shower for shower with England; or, if there be a distinction, the winter is keener and the summer more torrid, thus both requiring more diligence in repelling the effects of season. It cannot be poverty, for the French peasant has generally become a proprietor, and is now comparatively rich. It cannot be government, for, if governments act at all in the matter, it is to set the example of building, and even loading the public taste with prodigal decoration. Yet the French peasant goes on from year to year, and from age to age, sitting in a cottage as naked of comfort as if he sat on a hill in Siberia. A Tartar hut would be well equipped to the best of these hovels. They have not even the merit of being whited sepulchres, for a brush has never touched them since the moment when they arose from their original mire. The truth is, that "home," as it has been a thousand times observed, is not *French*. There is but little gathering round the family hearth, the cottage is not the place of their mirth. They return to it to sleep; they go to it as men go to the church-yard, because they cannot help it. Their festivities are for the guingette, their superfluous coin is expended on the gilded head-gear of the rustic belles, or the flame-coloured waistcoats and flowered stockings of the rustic beaux. While the summer lasts they live in the open air, working, dancing, eating, and flirting, *sub dio*. When the winter comes, they cluster together in their huts, like bees, with no more concern for their furnishing than a generation of rabbits in their warren. There they *hybernate*, dismal, dark, and frozen, until the first gleam of sunshine rouse them, lets the whole tribe loose like the swallows, and all is fluttering, frisking, and hunting flies, or matters to the full as light as flies, again.—*Fragments of a Journal in Bretagne in Blackwood's Magazine for September 1835.*

III. *A Moving Bog*.—This rather rare phenomenon has been lately witnessed on a part of Lord O'Neill's estate, in the neighbourhood of Randalls-town, on the Ballymena road, and about two miles and a half from the former town. The following is the substance of a letter which we have received from a gentleman who was at the place on Saturday last:—"On the 19th ult., in the evening, the first movement occurred. A person who was near the ground was surprised to hear a sort of rumbling noise, as if under the earth; and immediately after, his surprise was not a little increased, on perceiving a part of the bog move pretty rapidly forward, a distance of a few perches. It then halted, and exhibited a broken, rugged appearance, with a soft peaty substance boiling up through the chinks. It remained in this state till the 22d, when it suddenly moved forward, at a quick rate, covering corn fields, potato fields, turf-stacks, hay-ricks, &c. not a vestige of which now remains to be seen. So sudden and rapid was this movement, that the adjacent mail-coach road was covered, in a few minutes, or rather moments, to a depth of nearly twenty feet. It then directed its course towards the river Maine, which lay below it; and so great was its force, and such the quantity of matter carried along, that the moving mass was forced a considerable way across the river. In consequence of the late heavy rains, the river has again found its channel through the matter deposited in its bed, otherwise the water would

have been forced back, and immense damage done to the land on the banks. The fish in the river have been killed to a great distance. The damage done by the mossy inundation has been very considerable. About 150 acres of excellent arable land have been covered, and rendered totally useless. Down the middle of this projected matter a channel has been formed, through which there is a continual flow of dark peaty substance, over ground where only two weeks ago the reapers were at work. A house close by the road is so far overwhelmed, that only a part of the roof is to be seen. Besides the actual damage sustained, the utmost alarm prevails, and the people living adjacent to the place have been removing their furniture, &c. to a distance. All manner of absurd reasons are assigned to account for the destroying visitation; but as the cause is one of a natural and sufficiently well ascertained kind, it is useless to dwell upon the solutions offered by ignorance."—*Northern Whig*, October 1835.

IV. *Origin of Eating Goose on Michaelmas Day.*—Queen Elizabeth, on her way to Tilbury Fort, on the 29th of September 1589, dined at the ancient seat of Sir N. Umfreville, near that place; and as British Bess had much rather dine on a high-seasoned and substantial dish than a simple fricasee or ragout, the knight thought proper to provide a brace of fine geese, to suit the palate of his royal guest. After the Queen had dined heartily, she asked for a half-pint bumper of Burgundy, and drank "Destruction to the Spanish Armada." She had but that moment returned the glass to the knight, who had done the honours of the table, when the news came (as if the Queen had been possessed with the spirit of prophecy) that the Spanish fleet had been destroyed by a storm. She immediately took another bumper, in order to digest the goose and good news; and was so much pleased with the event, that every year after, on that day, had the above excellent dish served up. The court made it a custom, and the people the fashion ever since.

QUARTERLY AGRICULTURAL REPORT.

August 1836.

Now that "autumn spreads her treasures," but not "to the sun," we may safely say that the past summer has been the most uncomfortable of any for many years. June was one continued bluster. July began with making an "amende honorable," but the severe thunder storm of the 7th completely destroyed our hope of a warm summer. Three or four days of August of sunshine only came to tantalize us, and make us take the worse with the windy cold wet dull weather which we have since had. Atmospheric symptoms, it seems, must now be interpreted by a rule contrary to what we have been accustomed. Westerly winds now bring cold, and heat accompanies only the easterly. In these circumstances crops cannot be expected to be luxuriant or early. They are neither. The wheat is thin, and will, we fear, be neither prolific nor of good quality. "It is never a good sign of wheat," said a Carse of Gowrie farmer, "when you see pigeons alighting among a standing crop of it and

not breaking it down." Quite a true observation, and the phenomenon may be seen every day. Barley is a better crop than wheat, the latest sown being the bulkiest, but latest crop. Oats in good situations will be the best crop, for they can endure a good deal of rain, cold and wind. In upland districts they are late, but tolerably good. Peas and beans are not well podded, and will scarcely ripen. There is not much laid corn, but the extraordinarily high wind on a Sunday about a month ago has twisted each stalk round, so that the heads of wheat and barley look about in every direction. The harvest, we apprehend, will be a very prolonged one. We hear of some patches having been already cut down. We see others ripening fast; while some are yet as green as leeks. No season has shewn the superiority of good land, and of land in high heart, more strongly than this; in which circumstances all the crops are the earliest and best; in the opposite circumstances they are late and inferior. Thus we see good farming greatly tends to counteract the baneful effects of weather.—The pasture was late of rising, and owing to its retardation the white clover appeared in very great profusion, and produced excellent pasture for a time. It is now bare on light soils: On the hills it is yet good. The hay in most situations was a very light crop, and is very dear. The turnips exhibited a quick and beautiful braird. About that time was the only growing weather this summer. The earliest were soon thinned, and grew apace beyond danger, and are now excellent. The later suffered much from heavy wind and rain after being thinned. They are behind the earliest, and will never overtake them. The latest were not thinned till after the awful storm of wind. Whether they will arrive at usefulness will entirely depend on the autumnal weather. The latest were delayed in being sown in time for want of bone-dust. Not that bones were really scarce, but that they were not imported in requisite quantities, because the farmers would not give their orders in time to the bone-crushers. Farmers may depend upon it that millers will not import bones at a risk, merely to suit their convenience. Let them give their orders in due time, and bone-dust will not be wanting in due season. A few bushels more than requisite for turnips can never be lost upon a farm.—Potatoes, from many partial failures, are very various, from a very good to a very bad crop.—The prices of stock continue high. The losses sustained in the sheep stock among the hills this spring must tend to maintain the present prices to the ensuing season; but, independently of every other circumstance, the great demand for wool cannot fail to enhance the price of sheep. Large shipments of stock are still sent weekly to the London markets. We have seen many lots of lambs sent from Forfarshire, which, we conceive, were quite unsuited to the London market. Surely the shippers of stock must not know their trade when they send lambs of 7 lb. or 8 lb. per quarter to London, and yet these are bought up in the country at high prices. Good speed to breeders say we. But of a truth wild

speculators tend to drive the steady buyers out of the market, and in the end injure the interest of the breeder as well as their own. We regret we could not attend the Wool Fair at Perth on the 12th July. Little notice was taken of it in the newspapers, but that little communicated the valuable fact, from an English stapler, that Scotland may now compete with England for long wool. We have no doubt that, when the day of meeting can be so fixed in relation to Inverness and St Boswell's Fairs, as those two strings pulling in opposite directions may not derange the equilibrium of this middle point, that the fair at Perth will rival either of them.—From all accounts the summer has been better in England than in Scotland: the crops are much earlier, and their bulk and quality are spoken of in favourable terms.—In Ireland the state of the crops are about the same as in Scotland.—Islington market still meets with persevering opposition. We regret it, not that we have a personal interest in the matter, but on the score of humanity towards the live stock. Many salesmen, it seems, complain of the distance to Islington. That inconvenience may account for their absence from Islington, and it may be the only motive for their absence, for personally they can have no interest in upholding that great nuisance to man and beast—Smithfield: but does this consideration never occur to them, and we hope it will at least now occur to them, that it is much easier for them to walk or ride or *drive* to Islington, than for stock to be *driven* to Smithfield.

The Agricultural Committee of the House of Commons, after publishing three volumes of evidence, have resolved that they shall not make a Report of their opinion of the question, whether the Legislature can do any thing for the relief of agricultural distress. Common report says that a Report was drawn up by Mr P. Thomson, President of the Board of Trade, a member of the Committee, containing a proposition to repeal half of the Malt-tax, on condition of repealing wholly the Corn Laws. This notable scheme of wholly robbing the farmer, that he may partially relieve himself with his own goods, was too bright an idea for Mr Thomson; for it appropriately originated with an Irishman (Sir H. Parnell), and had it been formally brought before the Committee it would have certainly been carried, for the friends of agriculture were in a decided minority. Rather than risk such a division, the agricultural members suggested there should be no report; and the proposition was readily acquiesced in, for it served the true purpose of those who originally formed the Committee, that its labours should terminate in "much cry and little wool." As matters stand, no practical measure can now be introduced into Parliament founded on the evidence, backed by a recommendation of the Committee. Much difference of opinion exists among farmers, of the power of the Legislature to do good to the agricultural interest in Scotland. Amongst those of them who take a negative view of that power, we have received a communication from one who has paid much attention to the subject, and who, as a farmer, has a great stake in Scotland. In support of his opi-

nion, that the agricultural interest in Scotland cannot be much improved by the Legislature, he maintains that few taxes directly affect agriculture, and that their repeal would only improve that interest in common with other interests. He notices the effect of the war in raising prices and rents, and forcing poor soils into cultivation, all of which cannot now be maintained. He then depicts the effects of raising the standard of the currency, as having deprived the farmer of his capital, and left him unable to meet new difficulties; but whose injurious effects are now less felt, on account of the reduction of rents and other charges. But other evils, he conceives, have operated to the prejudice of the Scotch farmer; the facilities of transit by steam, and the series of abundant harvests, have brought an overwhelming competition against him. Formerly Scotland had her own home market,—now she has to withstand the competition from the better soil and climate of England, and the unbounded importation of corn and cattle from Ireland. On considering the remedy for these changes, he says, “I do not see how the Legislature can remedy these evils; nor do I see very clearly any remedy other than the gradual change which is begun, and rapidly advancing, to the abandonment on the light soils, of the raising of bread corn, and the applying of these to the growth of *beef and mutton and wool*. In the course of time rents will change also; but rents are only a small part of the cost of producing corn, and, therefore, in the course of time, there must be other changes as well as the diminution of rents. These considerations, however, are deserving of much attention in regard to the Corn Laws. Unless there be protection, it is plain that, ere much time elapses, a very great portion of our present corn land will be out of cultivation. We will raise cattle and sheep, but we will not raise much corn; the consequence will be, that we will become dependent on foreign countries for *bread*. Should not this make the manufacturer bethink himself, before he clamours for refusing that protection which is necessary for the growth of corn in our own country? I confess I am strongly persuaded, that the actual operation of the present corn laws tend more to the security of the consumer than the grower; and that if they were repealed, the farmer would suffer less injury from the repeal, than would fall on the manufacturer and consumer. For, observe, that the present corn law, by introducing a variable and conditional duty, and allowing corn to be bonded, has put a stop to all speculation in home corn; the consequence is, that the home farmer, instead of having the aid of the speculator, gets only the price of the day, depending on the immediate want and the immediate supply. Thus, instead of there being large stores of home grown corn in the speculator’s hands, there is now only a very small supply in the granaries, and that is annually diminishing.

“The speculator has his stock, not of home grown corn, but of foreign grown corn, in bond; thus, whilst other causes are operating powerfully to depress the price of corn, the existing corn laws have had a like ten-

scarcity. Consider what would be the effect of a few bad harvests. We see that when we have had a bad season, it is not confined to ourselves, but extends over all the corn growing countries of Europe. Think of the fearful consequences of our immense population, dependent to a great extent on foreign supply, without grain in our stores, but living from hand to mouth,—the foreign markets poorly supplied as well as our own, perhaps war at the same time, where would then be the profit of the consumer? My conclusion then is, we are not to expect relief to agriculture from its present depressed state, through any repeal of taxes, or any interference of the Legislature, except by direct protection; that it must be left to the operation of the changes which are already in progress; but that it is the duty of the Legislature, and the interest of the consumer, to give a protecting duty to the home grower of corn, and that duty should be a fixed and unchangeable rate, *sufficient to enable him to compete with the foreign grower, and it should be payable on importation.* By the aid of such a duty, though the inferior soils would be driven into grass, yet there would be a vast quantity of corn raised in the kingdom; and by the speculator having to pay the duty on landing, and being at liberty to sell his corn, the competition would be fair and direct, both for the consumer and the grower,—the grower having the aid of the protecting duty, and nothing more; while, on the other hand, there being no hazard, as at present, of a deluge of the market by foreign corn free of all duty, the speculator would buy from the home grower when the home crops were abundant and prices low, and thus, while the grower would be benefited, the consumer would also have protection, not merely from greater quantities being raised, but from the granaries of the merchant being full for a time of scarcity. My opinions in regard to the condition and prospects of the agricultural interest in Scotland differ, I know, in many respects from what appears to be the common opinion among many farmers, and therefore it is with some hesitation I venture to offer them."

In giving publicity to these sentiments, which we know have been approved of in a high quarter, we would just remark, that in growing less corn, and more butcher's meat, it does not follow that the lands of poor quality, though driven into grass, should be driven out of cultivation; for every farmer knows that poor land is quite unsuited to grow permanent grass to fatten stock. It requires land of high quality to do that. To throw poor land, therefore, out of cultivation, is to throw it away altogether. Poor land grows fair corn and green crops under the plough; in this it is valuable; but not to lose that value—not to throw it away, but will still be kept in the rotation of cropping, though the rotation will be extended a number of years when in grass, that the whole farm economy may arrange itself to the changed circumstances of the times. The poor land will thus contribute its share to the plough as well as to the fire engine; it will still grow corn and turnips as well as beef, and

mutton, and wool ; it will not be driven out of *cultivation*. On the contrary, we are confident that more poor land will be brought into cultivation, to enable the extended rotation to supply grass and turnips for the increasing demand for beef, and mutton, and wool, and also to supply home corn to the home demand from the better land. This state of improvement, however, can only exist under the protection of corn laws. We should not have ventured a remark on the subject at this time, had we not heard the sentiments upon which we have remarked expressed by many farmers. But the question, whether the Legislature can improve the condition of the farmer, has been as particularly investigated by the House of Lords as by the House of Commons. The Noble House has made no report on the evidence adduced before them, but, if the newspapers speak truly, the propriety of issuing a report was negatived in the committee by a majority of only one. The report was said to have been drawn up by Lord Wynford ; and, if what has found its way to the public be a true copy, the sentiments and reasonings which it contains is deserving the attentive perusal of every agriculturist. " It goes somewhat deeply into the subject, and is on that account the more acceptable, for we desire nothing more entirely than that the question of agriculture, and the present position of the agriculturist, shall be opened, examined, sifted, criticised in all its bearings, and in the fullest detail. Sure we are, that the more closely and minutely the question is looked into, and the more discussion that can be provoked on the subject, the better for the farmer and the landed interest." Though with no intention of following the rejected report into all its particulars, we may notice those parts of it which alludes to the subjects which most excites the general interest. The Committee acknowledge that much distress undoubtedly prevails among the owners, occupiers, and yeomanry of England ; that the price of labour is higher than the price of produce, the former having only been lowered 1s. in 8s. or 9s., whereas the latter has experienced a depression of 30 to 50 per cent ; that the labourer is living at the expense of his employer ; that when rents and other charges are farther reduced, the next step will be a general reduction in the wages of labour ; that should this be coupled with any diminished means of obtaining the necessaries of life, the means of the farmer to give employment would be still farther reduced ; that the distress has chiefly arisen from the depressed price of corn ; that the Committee feel difficult to declare a positive opinion whether the depression in the price of wheat is attributable to an increase of its growth beyond the increase of population, or to a decrease of consumption, or to both ; that all the witnesses who had the best opportunity of observation agree that the depressed price of corn is referable to a contraction of the circulating medium consequent on the resumption of cash payments by the Bank of England ; that the high prices of barley, beef, and mutton, have arisen from causes, such as scarcity, which do not disturb the general

rule, that the quantity of money must determine the general price of commodities. The remedies which the Committee recommend, at the suggestion of the witnesses, for the evils enumerated, are, that the standard of money should not be confined to gold, but that it should be a mixed standard of gold and silver, such as always was used in the country before the bill of 1816; that in order to check the inordinate imports of agricultural produce from Ireland, a well considered plan of poor laws should be established in that country; that a modification of taxation might be made, so as to enable the executive to reduce the malt tax; but as the amount of that prolific tax could not be spared so as to maintain our obligations to the national creditor, a substitute might be found for it either in the equalization of the land tax, which has been almost entirely evaded by all other descriptions of property, although originally designed to fall on all, personal as well as real, or by a duty on beer; that a remission of the duty on soap might be effected by substituting for it the imposition of a higher duty on foreign tallow; that complaints have been made against the warehousing of foreign corn in our ports, because the corn merchant, being able to buy foreign wheat at perhaps half the price at which it can be profitably grown in this country, and having the same facility of bringing it to market which he would have with English wheat, is led to speculate exclusively in foreign produce to the detriment of the English growers, whose surplus produce might be accumulated in our warehouses as is the case with foreign corn. That other suggestions were made in the course of the evidence of minor importance, for which the Committee would refer to the evidence itself, and as matters of detail they appear well worthy of consideration.

A pamphlet has just reached us, entitled "Observations on the present state and future prospects of agriculture, illustrative of the advantages of an Experimental Farm, being a fuller development of the author's views first made public, in a communication addressed to the Highland Society of Scotland. By George Lewis, tenant in Boglillie, near Kirkcaldy." The expediency or in expediency of establishing an experimental farm should be discussed in a larger space than we can at present spare, especially on the broad basis upon which Mr Lewis discusses it in his *brochure*, which comprehends the consideration of the best method of making public, and ascertaining the value of implements—the preparation of the soil—the purification and classification of seeds, roots, &c.—the breeding of cattle, horses, sheep and swine—the feeding of cattle and horses—the nature and application of manures—and reaping; all of which important operations, he maintains, can be better improved and established on an experimental farm than elsewhere. The subject is of much interest to a farmer, and deserves a thorough consideration. All we shall do at present is, to notice some remarks by Mr Lewis in his preface on the conduct of the Highland Society towards his proposition for the establishment of an experimental farm at the expense of the Society, and by which he seems to consider himself some-

what aggrieved, at least his remarks are written in a complaining mood. His complaint appears to amount to this, that the Society came to a decision on his plan before the proper time, before he had ascertained the sentiments of the tenantry of Scotland on it. "My feelings of surprise and mortification may therefore easily be conceived," says Mr Lewis, "when, in a distant part of the sister kingdom, I read the decision of the Society, on a question which, if the Directors had either perused the suggestions or the advertisements, they must have seen was not before them." He does not blame the late Duke of Gordon, the President of the Society, for bringing the subject before the Directors, nor does he blame the Directors for not having approved of his scheme, but he does think their "decision was come to without the whole bearings of the case being fully considered, or the sense of the agriculturists fairly ascertained." Now, in the worst view which can be taken of the Society's rejection of Mr Lewis's scheme, even according to his own statement, he has very little ground of complaint. For previous to the time when the Duke of Gordon brought the subject before the Directors, Mr Lewis himself had addressed the Society in a lithographic letter, of which we have a copy, in which the establishment of an experimental farm, at the expense of the Society, is strongly recommended for their adoption. The question, Whether they ought to establish an experimental farm at their own expense or no, was therefore formally before them, until they gave an answer to the proposal; and they gave an answer in the negative, and told Mr Lewis that an experimental farm was inconsistent with their plan, for certain given reasons, but that they should do their utmost to make the scheme on a moderate scale, were it placed at the disposal of the Society, conducive to the public advantage, alluding, we suppose, to such an experimental farm as has been established by the Duke of Buccleuch at Smeaton. Since, then, the Society thought, and they were certainly the best judges in such a case, that an experimental farm was inconsistent with their plan, it was surely unnecessary for them to delay expressing their decision on the proposition, and as surely immaterial to them whether "the whole agricultural community" expressed their approbation of Mr Lewis's scheme or not; and if "the whole bearings of the case" were not at first brought before them, but which have only been before the public since the late publication of his pamphlet, who was to blame but himself for that neglect? In these circumstances, it is scarcely fair in Mr Lewis to attempt to disparage the General Shows and Museum of the Society, as is done at page 90, *et seq.* There may reasonably exist a wide difference of opinion in regard to the absolute utility of general Shows and Agricultural Museums, but that inventors of agricultural implements, and experimenters in agricultural practices, will be more readily induced to give publicity to their discoveries by a system of rewards, such as the Society has instituted, than from a mere desire to promulgate them gratuitously for the benefit of the agricultural community,

which is the only inducement that an experimenter can have in offering his discoveries to an experimental farm, is a proposition which admits of no difference of opinion, so long as human nature is constituted as it is. For ourselves, we should rejoice at the establishment of an experimental farm on an extensive scale, through the influence of a few men of landed property and wealth, but we heartily approve of the rejection of such a proposition by the Highland Society of Scotland, as presently constituted by its Charter.

Our excellent friend Mr Lawson has put forth a book, the title page of which explains the nature of its own contents, namely :—"The Agriculturist's Manual, being a familiar description of the Agricultural Plants cultivated in Europe, including practical observations respecting those suited to the climate of Great Britain, and forming a Report of Lawson's Agricultural Museum in Edinburgh." The contents or index shews the vast variety of agricultural productions which have found their way to the Agricultural Museum in Edinburgh; a number and variety which, we have no doubt, excites the astonishment and admiration of many country men who spend a leisure hour in it. This Manual forms a ready and excellent book of reference to the botanical and familiar description of all plants which are cultivated in the agriculture of Europe. In this respect, it imparts an interest to the reader superior to any purely botanical work. If any part of it is really more edifying and better executed than another, it is that which treats of the Coniferae, and in which the properties of the pine, the fir, and the larch, botanical as well as economical, are described in a manner superior to any other single book on the subject.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of July 1835, and 5th of July 1836,—showing the Increase and Decrease on each head thereof.

	Quarters ended July 5.		Increase.	Decrease.	Years ended July 5.		Increase.	Decrease.
	1835.	1836.			1835.	1836.		
	£	£			£	£		
Customs, . . .	4,401,637	4,842,887	381,260	..	18,004,725	19,167,197	1,162,402	..
Excise, . . .	2,508,048	3,215,069	715,021	..	11,698,607	12,435,519	734,912	..
Stamps, . . .	1,694,171	1,734,987	110,096	..	6,493,028	6,732,902	239,874	..
Post-Office, . .	342,000	376,000	34,000	..	1,390,000	1,450,000	60,000	..
Taxes, . . .	1,600,393	1,571,150	70,787	..	3,987,591	3,690,900	..	196,691
Miscellaneous, .	10,789	7,974	..	2,815	61,936	62,806	870	..
	10,441,028	11,747,347	1,309,134	2,815	41,435,887	43,536,334	2,397,098	196,691
					Deduct Decrease, . .		196,611	
					Increase on the year, .		2,100,447	
			1,306,319					

TABLES OF PRICES, &c.

Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets :—

LONDON.										DUBLIN.									
Barley.					Oats.					Rye.					Pease.				
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
34 2	23 2	33 2	40 2	35 8	34 1	23 10	33 6	40 6	37 3	32 9	24 7	34 6	38 9	38 9	34 3	24 7	34 6	38 9	38 9
34 0	25 8	35 10	40 2	38 0	33 11	25 6	35 6	41 6	39 1	32 5	25 2	35 2	40 6	39 3	33 0	24 8	34 6	40 2	39 5
33 0	24 8	34 6	40 2	39 5	34 9	24 2	35 8	40 8	38 6	33 9	23 11	36 6	42 6	38 5	33 11	23 11	35 6	43 6	38 11
34 6	24 0	35 0	39 10	39 0															

LIVERPOOL.										EDINBURGH.									
Barley.					Oats.					Rye.					Pease.				
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
27 9	22 2	32 6	40 0	39 4	32 0	23 2	33 4	41 0	41 3	29 11	23 9	33 6	39 6	40 10	33 1	23 8	35 6	41 6	41 3
30 3	24 7	32 10	40 6	42 7	30 9	24 3	35 6	41 8	40 10	30 10	24 10	34 6	40 6	39 7	29 10	23 10	35 8	40 6	40 4
31 2	23 5	35 6	41 6	41 3	29 7	22 2	36 6	42 4	40 9	33 4	22 2	35 8	41 6	39 3	33 10	22 6	34 6	42 6	39 10

Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Bar. 9 St.
1836.	s. d.	s. d.	s. d.	s. d.	s. d.
May 6.	31 8	16 4	14 4	13 6	16 6
15.	31 6	16 2	14 0	13 8	16 4
20.	32 0	16 0	14 2	13 9	16 5
27.	32 2	16 6	14 4	13 9	16 9
June 3.	32 0	16 4	14 2	13 10	16 10
10.	32 6	16 0	14 1	14 0	16 8
17.	33 0	16 4	14 2	14 4	17 0
24.	32 0	16 8	14 6	14 6	16 9
July 1.	31 6	16 4	14 4	14 0	16 6
8.	30 6	16 2	14 4	14 2	16 4
15.	28 6	16 6	14 6	14 0	16 0
22.	29 6	16 10	14 8	14 6	16 6
29.	28 8	16 9	14 7	14 6	16 8

using the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th . 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN the Duties payable thereon, from May to August 1836.

Duty.	Barley.			Oats.			Rye.			Pease.			Beans.		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
39 8	32 8	32 1	13 10	25 1	22 1	13 9	32 8	30 10	24 5	36 0	12 6	37 6	36 3	15 6	15 6
38 8	32 4	32 4	13 10	25 1	22 1	13 9	32 4	31 6	22 9	40 10	13 12	38 9	35 10	14 6	14 6
38 8	32 9	32 9	13 10	23 9	22 8	13 9	33 8	33 1	21 3	39 1	11 0	39 9	37 6	12 6	12 6
37 8	32 9	32 11	13 10	23 8	22 11	13 9	35 01	33 1	19 9	38 11	11 0	39 11	38 3	12 6	12 6
37 8	32 10	32 11	13 10	24 8	23 4	12 3	32 7	33 2	19 9	40 7	11 0	39 11	38 10	11 0	11 0
37 8	32 3	32 0	12 4	24 5	24 6	10 9	34 10	34 3	18 3	40 1	10 0	39 7	39 8	11 0	11 0
36 8	32 2	32 9	13 10	21 1	24 2	10 9	36 3	34 9	18 3	40 8	10 0	39 11	39 11	11 0	11 0
36 8	32 8	32 8	13 10	23 10	24 3	10 9	35 11	35 1	16 9	40 5	9 6	39 11	39 11	11 0	11 0
36 8	32 1	13 8	13 10	23 10	24 3	10 9	36 6	35 2	16 9	42 10	41 1	39 0	39 7	11 0	11 0
36 8	32 10	32 8	13 10	23 8	24 1	10 9	35 4	35 8	16 9	41 6	41 3	39 0	39 7	11 0	11 0
36 8	32 7	7 3	13 10	23 8	23 11	12 3	33 9	35 5	16 9	45 8	41 7	39 7	39 7	11 0	11 0
36 8	32 4	4 3	13 10	23 9	23 10	12 3	34 10	35 5	16 9	40 1	41 8	39 7	39 8	11 0	11 0

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, showing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof: from 5th April 1836 to 5th July 1836.

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
May 5, 1836.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	3,680 4	..	3,680 4	6 5	1,295 0	1,301 5	493,192 0	43,577 4	536,769 4
Barley, . .	1 1	..	1 1	4 2	..	4 2	35,991 1	25 1 3	35,991 1
Oats, . .	1,638 6	..	1,638 6	73 6	..	73 6	217,475 3	699 0	217,475 3
Rye, . .	..	..	..	..	..	..	1,484 3	..	1,484 3
Pease, . .	2,862 0	0 2	2,862 2	337 6	0 2	338 0	10,816 1	..	10,816 1
Beans, . .	10,193 4	..	10,193 4	60 0	..	60 0	14,939 5	..	14,939 5
Totals, . .	18,629 7	0 2	18,630 1	501 3	1,295 2	1,796 5	773,898 5	44,683 8	818,582 3
June 5.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	8,858 6	..	8,858 6	7 0	614 5	621 4	497,690 4	43,257 7	540,947 1
Barley, . .	186 5	..	186 5	60 3	..	60 3	37,730 3	25 1 3	37,730 3
Oats, . .	6,728 0	..	6,728 0	97 1	..	97 1	223,112 1	699 0	223,112 1
Rye, . .	..	..	..	..	..	..	1,484 3	..	1,484 3
Pease, . .	7,967 1	4 0	7,971 1	2,598 3	4 0	2,602 3	16,096 1	..	16,096 1
Beans, . .	22,587 5	..	22,587 5	12 4	..	12 4	37,495 2	..	37,495 2
Totals, . .	46,228 1	4 0	46,232 1	2,775 3	618 5	3,394 0	813,728 6	44,683 8	858,412 4
July 5.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	24,314 7	..	24,314 7	3 5	575 1	578 6	518,857 1	42,722 6	561,579 7
Barley, . .	4,674 4	..	4,674 4	9,413 4	..	9,413 4	30,917 5	25 1 3	30,917 5
Oats, . .	6,167 2	..	6,167 2	1,156 0	..	1,156 0	225,824 7	699 0	225,824 7
Rye, . .	..	..	..	..	..	..	1,484 3	..	1,484 3
Pease, . .	15,813 1	0 3	15,813 4	14,000 4	0 3	14,000 7	16,261 4	..	16,261 4
Beans, . .	23,653 1	..	23,653 1	..	..	..	56,063 6	..	56,063 6
Totals, . .	74,622 7	0 3	74,623 2	20,479 2	575 4	20,054 6	851,669 2	43,473 7	895,142 9
May 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . .	21,050 0 0	..	21,050 0 0	1 3 24	2,432 0 20	2,434 0 16	183,370 0 8	11,185 3 13	194,555 3 13
Oatmeal, . .	..	..	..	..	..	..	76 2 24	..	76 2 24
Totals, . .	21,050 0 0	..	21,050 0 0	1 3 24	2,432 0 20	2,434 0 16	183,446 3 1	11,185 3 13	194,631 6 13
June 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . .	20,132 3 4	124 1 24	20,257 0 0	10 2 1	2,456 3 0	2,467 1 1	197,607 1 15	9,101 3 9	206,708 4 14
Oatmeal, . .	..	..	..	..	..	..	76 2 24	..	76 2 24
Totals, . .	20,132 3 4	124 1 24	20,257 0 0	10 2 1	2,456 3 0	2,467 1 1	197,684 0 11	9,101 3 9	206,785 3 13
July 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . .	24,290 0 18	..	24,290 0 18	0 0 20	2,353 3 7	2,353 3 27	197,886 0 13	6,748 0 2	204,634 3 15
Oatmeal, . .	3 0 4	..	3 0 4	..	..	..	76 2 24	..	76 2 24
Totals, . .	24,293 0 22	..	24,293 0 22	0 0 20	2,353 3 7	2,353 3 27	197,962 2 7	6,748 0 2	204,710 2 29

PRICES of BUTCHER-MEAT.

Date.	SMITHFIELD, Per Stone of 14 lb.		MORPETH, Per Stone of 14 lb.		EDINBURGH, Per Stone of 14 lb.		GLASGOW, Per Stone of 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1836.								
May,	7/6 @ 1/6	8/9 @ 3/6	7/9 @ 8/9	7/6 @ 9/	6/6 @ 7/6	6/9 @ 7/9	6/6 @ 7/9	6/6 @ 7/9
June,	7/3 8/	7/9 8/9	7/6 8/6	7/9 8/6	6/3 7/6	6/6 7/6	6/6 7/6	6/6 7/6
July,	7/ 8/	7/6 8/6	7/9 8/3	7/6 8/6	6/ 7/3	6/ 7/	6/6 7/3	6/6 7/3

PRICES of English and Scotch WOOL.

ENGLISH, per 14 lb.—Merino, Washed, 28/ @ 32/; In Grease, 22/6 @ 27/;—South Down, 24/6 @ 29/;—Leicester, Hogg, 24/ @ 28/; Ewe and Hogg, 23/ @ 25/;—Locks, 15/ @ 17/6; Moor, 11/6 @ 14/;—SCOTCH, per 14 lb.—Leicester, Hogg, 24/ @ 26/6; Ewe and Wether, 21/ @ 23/6;—Ewe, 20/ @ 22/6;—Cheviot, 18/6 @ 20/;—Laid, Washed, 13/6 @ 16/; Unwashed, 10/ @ 10/9; Moor, White, 8/3 @ 9/9;—Black, Washed, 12/ @ 14/; Unwashed, 6/3 @ 7/3.

THE
QUARTERLY
JOURNAL OF AGRICULTURE.

**BIOGRAPHICAL MEMOIR OF THE LATE RIGHT HONOURABLE SIR
JOHN SINCLAIR, BART., FOUNDER AND FIRST PRESIDENT OF
THE BOARD OF AGRICULTURE, &C. &C. &C.**

(Concluded from No. 34, p. 149.)

IN order to form some appropriate idea of the services rendered to Agriculture in all its branches by the late Sir John Sinclair, it is necessary, as we remarked at the commencement of this memoir, to look back to the state in which he found, and then at that in which he left it. We are not unaware, that several patriotic individuals made great exertions during the last century to improve the produce, and promote the manufactures, of Scotland; and husbandry has ample reason to be proud of her Cockburn of Ormiston *, her Hope of Ran-

* For a very excellent account of the agricultural improvements introduced into Scotland by John Cockburn, Esq. of Ormiston, we are indebted to the New Statistical Account, No. viii. p. 137-9.

“ John, the celebrated agriculturist, was born about the year 1685. During the life of his father he sat as a member of the Scottish Parliament, and took an active part in the proceedings connected with the Union of Scotland and England. He afterwards represented the county of Haddington in the British Parliament, and was continued in successive Parliaments from 1707 to 1741. But he was chiefly distinguished by his patriotic and benevolent exertions to promote the improvement of his native country.

“ Scotland, though now equally, if not better cultivated than England, was at that time far behind the sister kingdom. Mr Cockburn, from his residence in England, was well acquainted with the agricultural improvements that were going on there. He was anxious to introduce them into Scotland, and spared no labour nor expense to accomplish an object so desirable. The method he employed was a remarkable one. Leases were seldom of longer duration than five years, and proprietors had great difficulty in getting proper tenants to cultivate their lands. Mr Cockburn, with a view to encourage

keilor *, and her Craik of Arbigland,—not to mention several other names of kindred distinction ; but the general diffusion of this taste was certainly not very discernible among the prac-

his tenants to greater improvements, granted a lease of thirty-eight years duration, with a renewal of it for nineteen years more at the expiry of that time, and so on from nineteen to nineteen years in all time coming, upon their paying a certain sum as a rent or grassum at the end of every nineteen years. All the farms in the barony of Ormiston were let in the same manner, with some slight modifications. Thus, some are held upon a tenure of three lives ; in which case, when one dies, the tenant upon renewing it is bound to pay his grassum. If he do not renew it, and one of the two remaining lives fail, he forfeits his lease. An attempt was made at one time to set aside those leases, but it did not succeed. Some of them, by agreement betwixt the tenants and landlord, or by neglect of the tenants to fulfil the terms, ran out and reverted to the proprietor. About two-thirds of the barony of Ormiston, however, are still held upon those leases.

“ At the time the leases were granted, they certainly held out great encouragement to the tenants to improve their lands to the utmost extent of which they were capable ; but they were highly detrimental to the proprietor, and now prevent him from carrying on those improvements in the parish to which otherwise he might be disposed. It is impossible, however, to say how much the stimulus thus given might contribute to the general improvement of the agriculture of Scotland at that time.”

We should add, that he erected a brewery and distillery at Ormiston, which were carried on by Mr Wight, one of his tenants. He obtained premiums from the Board of Trustees for encouraging the culture of flax, and endowed a school for teaching young girls to spin linen yarn. To complete the process, he established a bleachfield at Ormiston,—the first in that part of the country, and probably the second in Scotland ; as, before 1730, fine linsens were generally sent to Haarlem to be bleached and dressed.

In 1732, he brought Mr Gordon, a land-surveyor, with him from London, and upon his plan laid out the village of Ormiston and the contiguous fields, which are all still beautifully enclosed with thorn-hedges, interspersed with majestic trees. Mr Cockburn also paid great attention to the public roads, and by his example in laying them out and keeping them in repair, tended in a high degree to influence not only his neighbourhood but the country in general.

In the fifth volume of the Farmers' Magazine, will be found an account of a society of noblemen, gentlemen, and farmers, instituted in 1736 by Mr Cockburn, for discussing, once a month, the most interesting subjects relating to rural and political economy.

About 1741, this distinguished patriot, retiring altogether from public life, devoted himself to the improvements of his patrimonial estates in particular, and of the country generally ; and died in 1747, leaving him a name which is still embalmed in the grateful recollection of the barony of Ormiston.

“ The Select Transactions of the Honourable the Society of Improvers in the knowledge of Agriculture in Scotland,” were printed at Edinburgh in 1763,

tical farmers of the country till the concluding ten years of the last century. In Dickson's Treatise, as well as in several other works systematically dedicated to husbandry as a science, we find a vast fund of admirable observation; but it is astonishing how little such books influenced the management of the practical agriculturist,—who, following the example of his forefathers, continued, in spite of lecture or lesson, to plod round in the same circle of contented and unambitious routine. In this point of view, the information collected by the exertions of Sir John Sinclair in the Statistical Account, were of incalculable value. The various plans suggested by circumstances and situations, as well as by the exertions of individuals in particular districts, were at once brought before the public; and thus a communication opened up, and a spirit of emulation excited, which brought the different sections of the country, as it were, into more immediate contact. In fact, the work operated, intellectually speaking, much in the same way as, in a physical point of view, the laying open new lines of road, and the im-

under the superintendence of Mr Maxwell of Arkland, one of its members. This gentleman, after eulogizing some of the nobility and gentry distinguished for their agricultural zeal, thus introduces Mr Hope:—

“ I cannot, without great injustice, omit to remark, and I believe you will all join me, that it has been much owing to Mr Hope of Rankeilor, your prees, that the society was entered into, and that the spirit of it rose so high, and hath been so long supported. His love to his country hath discovered itself remarkably; for he has employed his money, without public encouragement, his time, and prime years, to push husbandry and manufactures forward, and preferred the public good to his private advantage.

“ This valuable gentleman, who studied agriculture in England, France, Flanders, Holland, and other countries, and who has been instructing others in the knowledge of it, for a continued tract of more than twenty years, hath, for an example, evidently testified, upon a lease from the city of Edinburgh, what profit and what pleasure, an improvement, prudently designed and carefully executed, may afford. There, where there was once a morass called *Straiton's Loch*, he has raised beautiful hedges and trees, made rich meadows and pleasant walks, where gentlemen and ladies resort; and all around, in imitation of what he hath done, the power or prevalency of his example appears. At this place, now called Hope Park, you ordinarily meet in a society way; that, having the pleasant prospect, and the encouraging precedent in view, your zeal to promote agriculture may be the more excited.”—*Dedication*, p. vii-viii.

Besides a variety of valuable papers strictly on husbandry, the *Select Transactions* contain a great deal of useful information regarding the fisheries and the linen manufacture of Scotland.

provement of old ones, can be shewn to do in extending the resources of a nation. The operations of the Society for the improvement of British wool, and the transportation of the Cheviot breed of sheep into the more northern counties, have also been of incalculable value to the stock-farmer.

In connection with these general matters, we may add, that the first periodical devoted to agriculture, with which we are acquainted, was that conducted by Houghton, in the reign of James II. It was published twice a week, and was continued down to that of Queen Anne, with only some slight interruptions as to the regularity of its appearance. Early in the reign of George III., the *Musæum Rusticum*, and the sheets under the title of *De Re Rustica*, were successively attempted, but severally failed, as much, perhaps, from want of intrinsic merit as of public patronage. At different intervals, Dr Hunter brought out the four volumes of his "Georgical Essays,"—many of which are full of useful hints and practical observations. He contributed largely to the work himself, and he commanded the assistance of a variety of other correspondents. When the publication of these essays was discontinued, Mr Arthur Young, in conjunction with Mr Whyn Baker, the Dublin Society's experimenter in husbandry, made proposals to several respectable booksellers for the commencement of a regular periodical devoted to agricultural subjects. But, although both generously offered their services gratuitously,—the former as a contributor, and the latter as editor,—their negotiations were unsuccessful.

It was not till after the termination of the American war, and when the public mind was more prepared for the consideration of such subjects, that Mr Young, in 1782, commenced the *Annals of Agriculture*, which, continuing to appear at regular monthly intervals for a series of years, constituted during these the principal channel through which the prospects and improvements of husbandry were made known to the public.

At the commencement of the present century, the exertions of Sir John Sinclair had rendered him so conspicuous as well abroad as at home,—he had shewn such a splendid example, not only in the improvement of his patrimonial estates, and in the management of his native county, but in his more compre-

hensive efforts for the prosperity of Great Britain in almost all her relations of manufactures and commerce,—that he stood forth as the undisputed head, and the acknowledged champion, of the agricultural section of the community. Away from all jealous prejudices, and away from all political or party feeling,—known only through the report of his gigantic exertions, and seen only through the medium of his acknowledged publications,—the reputation of Sir John Sinclair soon became thoroughly European. Almost all the scientific societies on the Continent were proud to enrol him among their members, and in the agricultural works of France we find him designated as “*Le Premier Agronome de l’Europe*,”—“*Le Patriarche de l’Agriculture Anglaise*,”—“*Le grand Pretre de Ceres*,”—and “*Le Heros de l’Economie Rurale*.” That the Board of Agriculture owed its origin to him, and to him alone, is a fact which will not be disputed, and in the very charter of its creation he was nominated by his Sovereign to preside over its deliberations.

It may be interesting to some to learn that Sir John Sinclair came to reside at Edinburgh, soon after his second marriage in 1786. He lived at first in the Canongate, at that time still a fashionable place of resort, and afterwards removed to Charlotte Square, where his family remained till 1814. Sir John himself went regularly to attend his duty in Parliament, and during its recess annually visited his estates in Caithness.

In 1814 he removed with his family to Hare Common, near London, where he purchased a villa, to which he gave the name of Ormby Lodge, and at which some of his financial and agricultural pamphlets are dated; but, before the expiry of the same year, he again sold it, and, returning to Edinburgh, permanently fixed his residence in George Street. He continued, however, to make frequent excursions to London, and visited the metropolis for the last time in 1835, having remained there from May till September. He paid Caithness his farewell visit in 1830, leaving that county in a very different state from that in which he found it, when succeeding to the estates of his ancestors.

While reverting to the evening of Sir John Sinclair’s life,

the writer of this Memoir may be allowed to mention the circumstance of his having been honoured with his correspondence in 1832,—a period when the appearance of Asiatic Cholera among us, carried alarm and dismay through every province of the British empire. The opinion of the medical world was then, as it still continues to be, completely divided both as to the causes and the treatment of that disease, while a hundred pens were at work to prove that a hundred theories were true. Such an occurrence was of too great national importance for Sir John to remain an idle spectator; and, with his accustomed alacrity, he circulated a pamphlet “On the Means of preventing the extension of Cholera.” In this brochure he first considered the question whether the disease was likely to be localized in this country, and what were the best means for effectually keeping it under, or totally extirpating it. He then enters on the plans for restoring the fluidity of the circulating mass, and for replacing those saline substances, in which the blood of those labouring under Asiatic Cholera is said to be deficient; and he concludes with offering some hints for preventing the appearance of the disease, or mitigating its ravages.

Proceeding on the reports made by Mr Searle to the *Conseil de Medecine* at Moscow, by Dr Stevens of London, as to what has been termed “the saline treatment of cholera,” as also on the plan of injecting the normal salts of the blood dissolved in tepid water, as first suggested by Dr O’Shaughnessy, and afterwards practised by Dr Latta of Leith,—Sir John was thence fondly induced to believe, that there was a probability of the disease being prevented, if the blood could be kept in a healthy state, by supplying the system with saline matter,—which might be taken in more than the usual quantity with the food.

A copy of these hints was received by the writer along with the following note.

“Sir John Sinclair presents his compliments to Mr Moir, with the copy of a paper he has sketched out ‘on the Cholera,’ in which he should be glad to be favoured with any remarks, which may occur to him on its perusal.

It is certainly desirable that all good men should combine

to arrest the progress of a malady, which has committed such ravages amid the human race, and from which hardly any part of the globe is now exempted.

" MELVILLE HOUSE, PORTOBELLO.

16th August 1832."

Having, as the results of a too extensive and unfortunate experience, communicated these to the public in two separate pamphlets, the first entitled, " Practical Observations on Malignant Cholera," and the other, " Proofs of the Contagion" of that disease, the writer, in answer to Sir John, referred him to the opinions expressed in these, to which he added some additional facts and observations corroborative of them, which had subsequently occurred to him,—believing then, as he does still, that the predisposing cause of malignant cholera will be found in nervous exhaustion, whether produced by intemperate habits, by scanty nutrition, or by a natural delicacy of constitution, and that, although its remote cause is still in a great measure hidden from us, the disease appears to be solely communicated by human contagion. To this letter Sir John returned the following answer.

" Sir John Sinclair presents his compliments to Mr Moir. Was favoured with his valuable communication, which he will take an early opportunity of deliberately considering. In the interim, Sir John would be glad (if any opportunity should present itself) that Mr Moir would try the effect of water purified by being filtrated through charcoal (as liquid food to those who had contracted the disease), and would endeavour to ascertain how far a deficiency of saline matter in the blood gave the frame a *predisposition* to receive infection, when by any circumstance it came within what may be called the *vortex of contagion*."

" PORTOBELLO. August 15. 1832."

To the printed paper on cholera, Sir John also added, in the copy before us, some manuscript queries relative to the contagious characteristics of the disease.* In reference to the same

* A curious anecdote, corroborative of Sir John Sinclair's surmises, has been, within the last few weeks, going the round of the newspapers. It relates to the cure of two cases of cholera, by immersion in water from the thermal springs of Carlsbad.

important and interesting subject, Sir John, at this period, carried on a correspondence with various medical authors in different parts of the empire.

The same zeal and enthusiasm, which had animated the youth and maturity of Sir John Sinclair's life, continued unabated to its close. Down to a few days of his departure from among us, he pursued his favourite plans and schemes for the amelioration of human society, kept up his correspondence with the numerous circle of his European acquaintance, and enjoyed the social intercourse of the wise and good. Although no doubt naturally attached to the sayings and doings of other years, yet was he no mere *laudator temporis acti*, and he kept his heart green for the reception of new feelings. He interested himself most warmly on the extension of intercourse by railways and by steam; and years ago projected plans, which, though deemed a little extravagant at the time, are nevertheless, at the present moment, in the act of being carried forward to completion. In his royal correspondence, we pass from the Emperor Joseph of Austria down to King William the Fourth of England;—in his military, from Marshal Romanzoff of the Ukraine down to Field-Marshal the Duke of Wellington;—in his naval, from Lords Keppel and Howe down to Duncan and Nelson;—in his political, from Lord North down to the Marquis of Londonderry;—in his clerical, from Bishop Watson and Dr Price down to Dr Chalmers and Sir Harry Moncrieff;—in his statistical, from Dr Guthrie down to John Pinkerton;—in his agricultural, from the Marquis de la Fayette down to Mr Oliver of Lochend;—and in his literary, we find a succession of brilliant names, from Robertson, Smith, and Blair, down to Scott, Wilson, and Pollok.* Indeed, in the succes-

* Sir John Sinclair's conduct, with regard to Robert Pollok, was quite in accordance with his usual zeal for all that was praise-worthy or excellent. Being much struck with "The Course of Time," he sought out the author's acquaintance, and finding him in extremely delicate health, made application for a clerical situation in India for him, as a probable means of lengthening his life. As is well known, poor Pollok only survived the publication of his immortal work for a few months, having died at Southampton, while proceeding on an intended journey to the Continent.

The editor of this notice has great pleasure in reflecting on the circumstance of having had the MS. of "The Course of Time" submitted to

sion of letters, which make up the two large volumes of his published correspondence, and which we understand are but a mere sample of the huge mass which has been kept private, the great names which have for the last sixty years illustrated the pages of the world's history, pass, as it were, in phantasmagorial procession before us. From these we see at once, that, although warmly and patriotically attached to his native country, the philanthropy of Sir John Sinclair embraced the whole human race, and that, however separated by temporary political differences, mankind were but a more extended brotherhood.

In the preceding sections of this memoir, we have endeavoured, however imperfectly we may have succeeded, to give an outline of the services, which the late Sir John Sinclair has rendered to the cause of science and literature,—and, in a more especial manner, to the cause of agriculture, which ever appeared, during a career as laborious as it was extended, to form the main study and occupation of his life. From the accumulation of materials, and the long space in mere relation to time, which had to be gone over—the public course of Sir John having commenced as far back as 1775—it has been found impossible, without positively overlooking many prominent features of the subject, to be more brief and sketchy than we have endeavoured to be. This, however, we feel assured of, that every reader of this Journal will agree with us in allowing that we have not wasted time on an unworthy subject, and that few, perhaps no man that ever existed, ever more sincerely and unweariedly devoted themselves, from youth to age, to the great cause of humanity, than he did, whose recent loss Scotland may well deplore.

him, by his inestimable friend the late Mr Blackwood; and of his having recommended its publication to that discriminating patron of genius. He was not at the time at all aware who the author was, and knew nothing of the circumstances in which he was placed; but remembers being struck with the three first Books being written in a male, the others in a female hand.

The work was successful almost beyond all precedent,—scarcely excepting the works of Scott and Byron, or the *Lallah Rookh* of Moore; and it is needless to add, that Mr Blackwood, with his accustomed generosity and right feeling, made the family of Mr Pollok ample participators in the profits of its popularity. We believe that almost the last, if not the very last, act of Mr Blackwood's literary life, was the paying over a handsome sum to the relatives of the author, for the copyright of "*The Course of Time*."

We have seen that, from 1780, when he was elected representative in Parliament for his native county of Caithness, he remained a member of the House of Commons for a period of more than thirty years; during the whole of which time, without holding any situation of pecuniary emolument, he continued, under a succession of administrations, most patriotically to devote almost all his time, and the whole energies of his mind, to the public service. So early as the conclusion of the first American War, we find him writing on the state of our Finances, and dispelling the fears of bankruptcy that then hung over the nation, fostered by the desponding speculations of Dr Price and Lord Stair,—his history of the Public Revenue of the British Empire followed,—and in 1793, Mr Pitt, at his suggestion, brought in his proposal for the issue of Exchequer Bills—a measure of the greatest national importance at the period, and without whose adoption it is difficult to suppose, either how commercial distress could have been relieved, or national confidence restored.

Passing from his parliamentary career, and from his financial investigations, we find that these—enough to have engrossed the whole time and attention of an ordinary man—formed but a tithe of the toil to which the mind of Sir John Sinclair voluntarily subjected itself. In 1790 he had commenced his statistical inquiries; and, after an uncompromising struggle with the most formidable difficulties, for a period of seven years, he brought out the results of his correspondence with upwards of 1000 clergymen, in a work comprised in twenty-one octavo volumes,—which had no parallel in the past history of the world's literature, and which has served as the model for every thing that has since been accomplished in the same way. In fact, we may defy contradiction when we say, that Scotland cannot at this moment boast a prouder monument of the general talents and acquirements of her church and children, than has been collected in the Statistical Account of Sir John Sinclair.* We have also seen that he terminated his labours in

* We cannot resist the temptation of here quoting a paragraph of a letter from General Washington, dated 15th March 1793:—"I cannot but express myself highly pleased with the undertaking in which you are engaged (that of framing the Statistical Account of Scotland), and give my best wishes for

this branch of political research, by condensing into one volume the principal results obtained throughout the whole; and his analysis of the great work will long remain a token at once of his research and of his acumen.*

With regard to Agriculture we have before said, that perhaps no man who ever lived has done more, or in such a variety of ways, for the advancement of a knowledge so necessary to the happiness and welfare of the great family of mankind. The subject seems, for half a century, to have been almost always uppermost in his mind, in relation to some particular branch of its bearings; and he spared no expense, no bodily fatigue, and no mental exertion, to promote the welfare of mankind, by increasing the fertility of the earth's surface, and raising what had hitherto been, among all nations of the world, whether ancient or modern, but an imperfectly understood, and consequently an imperfectly practised art, to the dignity of a science, regulated by ascertained laws, and grounded upon fix-

its success. I am fully persuaded that when enlightened men will take the trouble to examine so minutely into the state of society, as your inquiries seem to go, it must result in greatly ameliorating the condition of the people, promoting the interests of civil society, and the happiness of mankind at large. These are objects truly worthy the attention of a great mind, and every friend to the human race must readily lend his aid towards their accomplishment."

* From the following extract from the *American Farmer*, a work printed at Baltimore (1820), it will be seen in what degree of estimation our Transatlantic brethren held the agricultural exertions of Sir John Sinclair.

"The North British Baronet, Sir John Sinclair, has made us rejoice in America, that we are masters of the language in which he delivered to the world his inestimable and immense collections of agricultural literature. Had his been a foreign tongue, we should not have expected to have seen a translation of them; and the vast body of simple and precious truths—truths in fact, and truths in reason—with which his extensive works are filled, would have remained to the many in America unknown secrets. He has taught us by the happiest examples, and the most effectual means, how to examine, and how to make a perfect exposition of the agriculture of a country, from the scale of a kingdom and a province, down to a county, a hundred, a tithing, or a township. He has drawn, by innumerable traits, so perfect a landed picture of Great Britain, that no traveller of any nation, however familiar with the English tongue, can ever hope to obtain such a knowledge of the kingdom by his own senses. He has a title also to our gratitude, from the generous views he has frequently taken of the colossal stature and natural capacities of our landed interest."

ed principles. Surely the man who has been so mainly instrumental in doing this, must ever continue to be regarded as one of the great benefactors of his species. His fame is above that of the Greek and of the Roman, for it is confined to no time, and it is limited by the bounds of no particular country. Indeed, we doubt if, in looking over the biographical annals of our own or other nations, any individual can be found who has more distinguished himself in so many branches of human knowledge, or who has left behind a greater mass of information on subjects vitally important to the prosperity of the human race. It has been said of him, and truly, that, "though not actually engaged in the conflicts of war, yet he raised and commanded considerable bodies of men, who were of the greatest service to his country, in the dreadful war carried on for so long a period, with the Republican and Imperial Governments of France; while these corps, owing to the excellent system of management he had adopted, were distinguished for an almost unprecedented state of health, and the superior excellence of their conduct; and that, though not a sailor, yet he defended the naval power and character of his country with almost unprecedented ability, when they were depreciated in parliament by a British seaman; while his exertions greatly tended to raise that spirit in the navy, which afterwards produced such astonishing results."

However strange it may appear, yet the history of human society in all ages and nations bears evidence to the fact, that the improvements in all those acts of life which dignify and adorn mankind, generally depend less on any regular or natural tendency in the progress of districts, or even countries to refinement, than on the gigantic exertions of individual minds, who, from time to time, seem raised up by Providence to shew not only what the short span of a single life is capable of achieving, but to stand forth as a beacon to direct the labours and stimulate the activity of others. Beginning with the introduction of agricultural improvements into the remote districts, where his patrimonial estates were situated, the influence of his example soon made itself felt to the extremities of the county, whence his sphere of action widened, pervading Scotland from one boundary to the other; and, while presiding over the

Board of Agriculture, a spirit of improvement was excited, which shewed itself not only throughout the British dominions, but in every country both in the Old and in the New World.

When we look back to the enterprize of that mind which, with undaunted courage, entered upon the great fields of the Statistical Account, the History of Finance, the County Reports, the Code of Health, and other tasks of collateral magnitude, and that, with unwearied perseverance, toiled on to their completion, calling in the assistance alike of books and men to its aid, our astonishment keeps pace with our admiration. Sir John Sinclair was, moreover, during all this period a public man, at one time attending his duties in Parliament, and at another commanding troops. We now see him presiding over the National Board of Agriculture, and now planning improvements in his native county. We find him alive to every discovery in art and science, patronizing neglected merit, and hailing the aspirant after literary renown into the field of fame. Yet we will be told by some, that Sir John Sinclair had his foibles—and so he had—and so has the sun his spots; but, after surveying his public career, after looking at the mass of knowledge, which he has bequeathed to posterity, it would be vain to dispute his claim to a station among the leading men of his age and country. Year after year, as time rolls on, that fact will become more and more apparent. Many of his hints, not yet acted on, will be then found as efficient in practice, as others which has been already proved by the test of experience; many of his speculations for the public good, for which due credit has not yet been assigned to their originator, will then be gratefully acknowledged. The testimony of other nations will be gradually accumulating to swell the mass of his well earned reputation; and the foreigner, visiting the Scottish metropolis, will seek out the spot where the ashes of Sir John Sinclair repose. And it is but just that this should be. The man, who devotes all his time and all his energies to the purposes of personal aggrandizement and selfish ambition, reaps the harvest in his own day; but it is reserved for the loftier mind to look far beyond the sphere of current gossip, or even cotemporary fame, and, if it pursues any end at all beyond the primary one of benefiting mankind, and raising the human race in the scale of being, a

satisfaction may sometimes arise from the cherished thought, that posterity is almost always just, and that the reputation partly denied to the man will be wholly paid to his memory.

On the 15th of December 1835, Sir John Sinclair was seized with his last illness. On the previous day he had taken a long drive, and appeared to enjoy much the conversation of a few friends who dined with him. Professor Forbes and Staffa were of the number.

Having passed an uncomfortable and sleepless night, he was, next morning, found by his servant in a state of great exhaustion. Dr Abercrombie and Mr Hamilton Bell were almost immediately in attendance. He was free from pain, he could not be said to be labouring under any specific disease, and his mind was perfectly collected; but stimulants were found quite ineffectual, either in reviving his strength, or in restoring the tone of the pulse. In this state Sir John lingered for some days, aware of his situation, and contemplating his approaching end with Christian fortitude and resignation. On the 21st, being seized with an affection of the heart, a state of asphyxia came on, from which he could not be recovered; but so tranquilly passed his spirit away to his Saviour and his God, that it is impossible to say at what precise moment he expired. Full of years and honour, his death was in happy conformity with a life spent in doing good, and from youth to old age ardently devoted to the best interests of the human race.

It were superfluous to add, that the death of this great and good man has been regarded as a national calamity; and at the meeting of the Town Council of Edinburgh, held on the day after that melancholy event, Councillor Robertson proposed, and the motion was unanimously agreed upon, "to enter on the City Records the regret of the Council for the death of Sir John Sinclair, and their respect for his memory; and that, in the event of a public funeral, the Council resolve to attend."

From the circumstance of Sir John Sinclair holding no official situation at the time of his decease, it was resolved by his family that the funeral should be strictly private; and, from the circle of his friends being so extensive, it was deemed necessary that only relatives should attend. This resolution, however, it was found impossible, without literally repelling the most ge-

nerous and unsolicited tokens of reverential regard, strictly to carry into effect. The Highland and Agricultural Society of Scotland, desirous of doing honour to the remains of one of its original members, and most indefatigable and distinguished supporters, proffered the attendance of a deputation, consisting of the six senior Directors and the Office-bearers. This was as it should be; and this mark of honourable attention was of peculiar value, emanating from an institution national in its character, and the success of which Sir John had so much at heart. Being deemed not incompatible with the previous arrangements, this honour was cordially accepted; and, on the night before the funeral, the Lord Provost and Magistrates of Edinburgh expressed their wish to meet the procession in their official robes at the gate of the Chapel Royal, and thence accompany it to the place of interment. Of this highly gratifying and most unusual distinction the family also gratefully availed themselves. The princes of Scotland slumber around him in his final resting-place; but, since the sceptre departed from Holyrood, the dust of a more distinguished patriot has not been commingled with theirs.

In person Sir John Sinclair was tall and spare; and even in his advanced years he was remarkable for the elasticity of his gait, and erect carriage. From his characteristic orderly habits, he was exceedingly neat in his dress, and he is said to have been in youth distinguished for his manly beauty. In the private walks of life, and in the exercise of the domestic virtues, he was a perfect model of the Christian gentleman, and with perhaps as few of the faults and frailties inherent in poor human nature as almost ever falls to the share of an individual, he set a noble example to the world of intellectual activity, uniformly directed, from almost boyhood to extreme old age, to the promotion of human happiness.

Before closing this imperfect memoir, let us ask the question, What has Scotland done to commemorate the services and virtues of Sir John Sinclair? Can we point to no pillar—to no statue—to no bust? We may be told that his best monument will be found in his works. This may be true as far as regards him, but is it either just or generous in us his countrymen?

ON HEDGE-BIRDS WHICH ARE ALLEGED TO BE MORE OR LESS
DESTRUCTIVE TO FIELD AND GARDEN CROPS.—NO. III.

(Continued from p. 190.)

III. DECIDEDLY DESTRUCTIVE HEDGE-BIRDS.

AMONGST the birds which fall to be considered under this division, some are so wild and wary as rarely to approach gardens, but all of them do more or less injury to crops in the open fields. I shall begin with those birds which are exclusively grain-eaters, and make no return for their depredations by destroying insects, though they no doubt contribute to keep down the diffusion of weeds by the quantity of their seeds which they devour, as will be adverted to in the sequel.

The goldfinch, gouldspink, or gooldie (*Fringilla carduelis*, Linn.), is a common and well-known, though not a very numerous species, probably because its peculiar food is rather scanty, and the supply precarious, particularly in the spring and early summer months. It is well and elegantly said by M. Mantheillard, that beauty of plumage, sweetness of voice, quickness of instinct, remarkable cleverness, proved docility, and tender affection, are all united in this little bird; and if it were rare, or came from a foreign country, it would be valued as it deserves. Like the gold-crested wren and the tits, it is the habit of the goldfinch to associate in single families of five or six during the autumn and winter, separating into pairs early in summer to build. The favourite spot for rearing the young is an espalier in the garden, or an apple-tree in the orchard, where the birds construct a neat and elegant nest with the softest down, and fenced round with lichens and moss.

The food of the goldfinch being almost exclusively confined to the seeds of plants with compound flowers (*Syngenesia*), the birds become useful during their breeding season, by devouring the seeds of groundsel, colt's-foot, dandelion, nipplewort, and the like, which may have escaped the hand or the hoe in any corner of the garden. At the same time, there are no garden-seeds ripe to which they can do injury, and they never resort, so far as my observation goes, to the seed-bed for plunder, having an aversion, at least in a wild state, to eat from the ground, and preferring to pick the seeds from the receptacle before they are scattered. In the cage, a goldfinch will eat the green heads of groundsel or chickweed: but whether we may infer from this that it may also eat seedling lettuce and endive, or disbud fruit trees, is more than I can venture to affirm, as I have never observed the fact. During the progress of the later broods, (they breed twice or thrice in the season), they can procure a much more abundant supply of syngenesious seeds, inasmuch as the greater number of plants of this sort flower and seed late in the summer. Then it is, indeed, that goldfinches commit the only depredations in gardens which are of any notice, by attacking the ripe and ripening seeds of lettuce, and en-

dive, as well as those of China asters and similar flowering plants. It would not be very difficult in any given district to prevent this, by extirpating the goldfinches, for they are very easily entrapped or shot; but few who delight in the lively song or the merry tinkling call-note of this pretty bird would wish to take the trouble, while the benefits conferred well counterbalance all the injuries done. The best way is to scare these birds from the vicinity of choice seeds when ripening, by a bit of netting or a stuffed owl, or even a few feathers tied along a thread.

One of the chief benefits conferred by the goldfinch on the gardener and the farmer is the destruction of thistle-seed. It is almost impossible, as is well known, to grub up every thistle in a district so as to allow none of them to run to seed, and the winged down attached to these seeds serves to spread them about to considerable distances. It is about this period that the old goldfinches and their young families-examine every ripe head of thistle-seed which they can find, and banquet on the contents. These, however, are sometimes scanty enough, for much of the thistle-seed never ripens, particularly if the weather be very dry to prevent its filling, or very wet to cause it to rot; while, in more favourable seasons, neither too dry nor too wet, certain small fly-grubs eat almost every seed in a district, as if Providence, by means of the birds and the insects, had created a check to the diffusion of these troublesome weeds. Any one who chooses may verify the fact respecting the grubs, by trying, as I have done, to collect the seeds of the several species of thistle, some of which, such as the musk and the milk-thistle, are by no means to be despised as ornamental plants. I never could find a single head of good seed on the musk-thistle (*Carduus nutans*), though it abounds in some places, as around Glasgow, in Mid-Lothian, and at Kew, on the banks of the Thames.

Dr Bechstein is probably mistaken in saying that the goldfinch, in a wild state, feeds on radish seed; and Buffon still more in saying that it feeds its young with caterpillars.

Passing over the siskin or aberdevine, which much resembles the goldfinch in habits, but is only a winter visitant in England, and does little if any injury, I shall next advert to the green-bird, or green linnet (*Loxia chloris*, Linn.), a very common bird in every hedge in the empire, and at once distinguished from all our native birds by its greenish-yellow plumage and thick bill. Its harsh notes, which serve for a song in the spring, may be heard on the borders of woods, copses, and hedges, where it builds, rearing more than one brood in a season; and notwithstanding its large moss-built nest, is conspicuous enough, even in a thick thorn bush, to expose it to the discovery and plunder of the school-boy; a sufficient number of the species is always reared to render it a formidable depredator at particular seasons.

The green-bird does not, like the chaffinch, feed its young upon insects, but upon vegetable food; and, during the breeding season, if near gardens, it will bite off the heads of seedling lettuces and cabbage plants; and, being a bold fearless bird, it is not so easily scared as the sparrow, which unites the most wary caution with all its intrusive impudence. Netting over the beds will be the surest protection; but if this is not convenient, recourse must be had to bird-lime or the gun.

In the seed season, again, the old green-birds, accompanied by their young broods, will attack almost every sort of seed that is ripe or ripening, but are more particularly destructive to cabbage, cauliflower, radish, and turnip-seed or flax, where that is grown. Oats and wheat, also, near woods and hedges, suffer considerably, the green-bird being a great eater, and its bill seldom idle, shelling and munching from sun-rise till sun-set.

In the later part of autumn, winter, and early spring, green-birds assemble in flocks not quite so numerous as linnets or larks, and pick up what seeds they can find, either in the pods or scattered on the ground. When wheat is sown, accordingly, they devour great quantities of the seed in the fields, though in many cases this may be rather an advantage (at least as some agriculturists might think) in thinning out the crop. The worst of it is, that the pickings are not regular, but in patches, where the flocks of green-birds chance to alight. It must not be concealed, however, that, along with its decided depredations on seeds and seedling plants, the green-bird also destroys many weeds in the same way; for when it does not meet with seedlings, lettuces, or cabbages in a garden, it will, as a make-shift, attack the chickweeds and groundsel, which it never touches when the garden-crops are to be had.

One of the worst depredations committed by the green-bird is, its disbud-ding of trees and shrubs. It particularly prefers the buds of currant and apple trees, but will often also strip all the blossom-buds of the lilacs and other flowering shrubs. There is no protection against these injuries except netting, or shooting the green-birds. I believe also, though I am not quite certain of the fact, that the green-birds do not make a daily round like the tits or the bulfinches, but are irregular in their visits, which renders them the more annoying. They are not, however, so apt as bulfinches to come into gardens near houses, being more partial to hedge-rows, orchards, and copses, for, though by no means wild or shy, they are not familiar, and seem to care less than most birds for human neighbourhood.

The yellow-hammer, yoyt, or yoldren, (*Emberisa Citrinella*, Linn.) is universally known as a hedge-bird, more gay and gaudy than the preceding, and very much disliked in certain districts, for some mysterious or superstitious notions unconnected with its destructive habits. It is a much more abundant species than the green bird, and breeds at least twice, and sometimes thrice, a-year, placing its nest most commonly in a tuft of grass or herbage at the side of a hedge or copse, sometimes as early as the month of March. Although the yellow-hammers feed their young exclusively on insects and caterpillars, they prefer, for their own eating, grain and seeds, particularly oats, and, in new sown fields of oats, as well as wheat, the yellow-hammers may be seen very busily picking up the grain, from the moment it is sown till the period of its sprouting or brairding. To the earlier sown crops, as these birds continue in small flocks till they pair and separate, they accordingly do no little injury; but, after pairing, as there is seldom more than a pair or two in the neighbourhood of one field, the damage which they effect cannot be great, and is partly compensated by the insects which they destroy to feed their young.

When the broods are reared, however, and the corn crops begin to ripen, the pairs become considerably increased in number, and add to the

assemblage of sparrows, buntings, and other plunderers, which leave little alongside the hedges but empty husks on the standing corn.

After this period, the yellow-hammers subsist by frequenting stubble fields; and, when the wheat is sown, they live for some weeks on the seed which they find not sufficiently buried, though they are by no means so fond of wheat as of oats.

The yellow-hammer does little or no damage to gardens, inasmuch as it rarely visits these, unless when they are in some very secluded place, or in the wilder parts of the country, where there are few hedges except the farmhouse garden hedge. In the moorish parts of Scotland and Cumberland, I have not unfrequently seen the yellow-hammer on the same garden hedge with the corn-bunting, which is a much more familiar bird.

The curl-bunting (*Emberisa Cirlus*, Linn.) is very similar in appearance to the yellow-hammer, as well as in habits; but, being by no means a common bird, it requires little notice here. It is known at first sight by the black streaks about the head, which are wanting in the yellow-hammer: besides, from its having less yellow on those parts, it looks less gaudy and more sober.

The reed-bunting, or black-bonnet (*Emberisa Schaniouulus*, Linn.), is often confounded by young naturalists and general readers in the north with the black-cap (*Sylvia atricapilla*), which it resembles in almost no particular, except the provincial name. It can scarcely be termed a hedge-bird, for the moorish and marshy places which it frequents have seldom any hedges, though it is found often sitting on such low bushes as grow in these localities, where the male will sit for hours and repeat his unmusical and monotonous notes, though often the only bird-music (if music it may be called) which is to be heard for miles, except that of the sky-lark. The bird in question, in size and form, is very like the yellow-hammer, but has its head marked with black where the other is ornamented with golden-yellow. The female has brown marks where the male is black.

The natural food is very similar to that of the yellow-hammer, though, from the black-bonnet being more partial to moors and marshy places, it has recourse more to the seeds of the plants that grow there than to any sown crops. The small patches of oats, however, occasionally sown by upland farmers after potatoes, are almost certain to attract the notice of all the black-bonnets, young and old, in the vicinity; and I have observed small flocks of them devouring the half-ripened oats on moorland crofts as late as October and November, when they are sometimes joined by flocks of the snow-bunting, when these chance to be driven thither by the early severity of the northern winter. As the black-bonnet is by no means shy, allowing one to approach very near it before it becomes alarmed, it will not be easy to scare the bird from the oats in such cases, and I know of nothing like to save the crop, except shooting or ensnaring the birds.

The black-bonnet is by no means so common in England, at least in the parts where I have been, as in Scotland. Near London, I have only seen one at large in fifteen years, though it is no doubt common in the fen districts, as I have observed it to be in similar parts in Holland, where it must be as destructive as the yellow-hammer. M. Montbeillard tells us, that, on the continent, these birds resort to high grounds in rainy seasons, and

assemble in the corn-fields in August, seeking their food in cultivated spots. Cramer says they are fondest of millet, though I never observed them myself in any of the numerous patches of millet which I have passed through in Germany. It is worthy of remark, however, that Buffon, and many of the continental writers, as well as some of our own naturalists, confound this bird with the reed bird (*Sylvia arundinacea*, Latham), and the sedge-bird (*S. mii-caria*, Latham), as is evident from their description of the nest, which is not, as they allege, ingeniously suspended over water by attaching it to the stems of reeds, but is uniformly built in the side of a bank beneath some slightly projecting turf or stone, and is of slender materials, more like that of the lark's than any other species. Neither does the black-bonnet, as they describe, sing in the night, though the sedge-bird, an inhabitant of similar localities, does.

The corn-bunting (*Emberiza miliaria*, Linn.), or, as it is sometimes termed, the stocking weaver, from its notes resembling the sound of a stocking-frame, is universally diffused over the country, though not in very great numbers, not being so plentiful as the yellow-hammer, but more so than the black-bonnet. It is larger in size, but very similar in colour to the sky-lark, which it also resembles in spreading out its wings horizontally as it flies, at least during the breeding season, though M. Montbeillard says, that, at other times, it flies equably and swiftly, mounting to a considerable height. Mr Knapp is much mistaken in representing it as frequenting lonely and solitary places, for, though it is common on the trees and hedges of meadows, it may also be seen about every farm-house garden, perched on the summit of an old elder, or the highest bush it can find, trilling out its harsh stocking-frame notes, for hours together. According to M. Belon du Mans, it is never found far from water, which it follows, he says, like a woodcock; but this remark does not accord with what I have observed of the habits of the bird in Britain, no more than its winter migration, as it remains with us all the year like the redbreast and thrush, while, on the continent, all these species migrate in winter, a little later than the swallows.

The bunting feeds wholly on grain, as is proved by its strong muscular gizzard, and its remarkable bill, both the mandibles of which are moveable, like those of a parrot, while the edges are re-entrant, the joining being made in a crooked line, and the edge of the under mandible on each side nearly one-third of its length, makes a blunt projecting angle, and is received by a corresponding re-entrant angle in the upper mandible, for the purpose of crushing seeds.

In the early spring, these buntings, together with the yellow-hammer and other species, devour considerable quantities of the newly sown seed corn, particularly oats and barley, and ought to be watched and scared away, or ensnared or shot. After the breeding season, they feed on the ripening seeds of beans, pease, wheat, oats, and other crops, while, during the winter, they feed on the stubble lands. They do not omit to visit the newly sown fields of wheat, and levy a heavy contribution on the seed. The following passage from Mr Knapp's interesting work, with exception of the mistake already pointed out, is of interest, as detailing a serious species of injury committed by the bunting.

"I am neither," he says, "inclined to seek after nor desirous of detailing

the little annoyances that these wildings of nature, in their hard struggles for existence, may occasionally produce; being fully persuaded that the petty injuries we sometimes sustain from birds are at others fully compensated by their services. We too often, perhaps, notice the former, while the latter are remote or not obtrusive. I was this day (January 25th) led to reflect upon the extensive injury that might be produced by the agency of a very insignificant instrument, in observing the operations of the common bunting (*E. miliaria*), a bird that seems to live principally if not entirely on seeds, and has its mandibles constructed in a very peculiar manner, to aid this established appointment of its life. In the winter season it frequents stacks in the farm-yard, in company with others, to feed upon any corn that may be scattered about; but, little inclined to any association with man, it prefers those situations which are most lonely and distant from the village. It could hardly be supposed that this bird, not larger than a lark, is capable of doing serious injury; yet I this morning witnessed a rick of barley, standing on a detached field, entirely stripped of its thatching, which this bunting effected by seizing the end of the straw and deliberately drawing it out, to search for any grain the ear might yet contain; the base of the rick being entirely surrounded by the straw, one end resting on the ground, and the other against the snow, as it slid down from the summit, and regularly placed as if by the hand; and so completely was the thatching pulled off, that the immediate removal of the corn became necessary. The sparrow and other birds burrow into the stack and pilfer the corn, but the deliberate operation of unroofing the edifice appears to be the habit of this bunting alone."

The tomtit, oxeeye, and some other birds, have been frequently observed to draw out the straws of thatch, but more probably when seeking for cursory insects than grain.

The skylark or laverock (*Alauda arvensis*, Linn.), though in no sense of the word a hedge-bird, as it does not and cannot from the structure of its feet perch on bushes, may be mentioned here as much more destructive than the bunting, both to the newly sown seed corn and to the ripening crops, inasmuch as the species is greatly more numerous. But few farmers, who have any taste for the sweet music of nature, cheering them in their labours and delighting them in their summer walks, when

" Invisible in flocket sky
The lark sends down his revelry,"

would grudge even more of the produce of their crops than is ever actually devoured by this interesting species. There is little question but they might find other food in the seeds of wild plants and weeds, could they be conveniently scared from the corn crops at the seasons when they do most damage; but, unfortunately, this cannot be easily done, larks being less afraid than most other birds of the usual means resorted to for such purposes.

The woodlark (*Alauda arborea*, Linn.) is not, like the skylark, incapable of perching, and frequents hedges as well as heaths and commons. It is by no means a plentiful bird, in consequence possibly of being more delicate than the skylark, and liable to the peculiar accident of having its legs frequently broken from the extreme brittleness of the bones, "a peculiarity," says Dr Bechstein, "which I have remarked in no other species of bird." As it does not

congregate in flocks like the skylark, the sown fields of wheat in autumn, and of oats in spring, are not so liable to be injured by this species. Indeed it is more apt to purloin a few grains from the standing corn, particularly when the fields are near its breeding haunts, such as the skirts of woods, copses, or patches of heath, furze, or juniper. It is much more timid and easily scared than the skylark; but it is so little obtrusive that it will seldom attract attention. Even its beautiful notes, which are only surpassed by those of the nightingale, are so soft and fluty, that they are seldom noticed, though an attentive listener may distinguish them clearly when the little songster, high in the air, repeats by the hour what Burns most happily calls its "soothing, fond complaining."

The linnets or linties, more particularly the grey species (*Fringilla cananabina*, Linn.), are very common in most parts of the empire, notwithstanding the numbers entrapped by bird-catchers, and the nests of young taken by schoolboys for rearing cage-birds. Their natural hardiness, the abundance of food which they can generally find, and the wild places in which they breed, are all circumstances favourable to the increase of the species. They do much more damage than is generally supposed. During the breeding season, indeed, they are not so much in the fields, and the injuries they do are chiefly confined to occasional excursions to the patches of turnips left to ripen seed, and, at a later period, to the newly sown turnip grounds; but when the young families begin to wander in small companies as the grain becomes ripe, they devour great quantities of standing corn, attacking it voraciously from the moment it begins to whiten in the ear till the sheaves are laid in the farm carts. After this period the small family companies associate in larger flocks, frequently uniting with green-birds, and subsist on the corn scattered on stubbles, as well as on the seeds of weeds, till the autumn wheat is sown, at which time their numerous bands make the round of the newly sown fields, and frequently thin the seed-corn so much, that the braird is scarcely worth preserving. In such cases, however, the farmer seldom dreams that the linnets have done him this injury, but accuses wire-worms, grubs, or rooks, though none of these may have destroyed a single grain. It is thus that mistakes are always committed by those who are not accustomed to natural history, of which several examples have already been given in the course of this paper.

The linnet, from being rather wild in its habits, is not a very common visitor of gardens, except when these are somewhat secluded, or the more extensive market gardens near larger towns. In such cases it is a very unwelcome intruder, as it not only strips the heads of lettuce when the seed is ripening, but is as bad almost as the sparrow or chaffinch in plundering the seed beds of the newly sown seeds, particularly cabbage, turnip, and radish.

In consequence of its wary timidity, the linnet is fortunately easy to scare, and in gardens this may be done by means of a stuffed owl or cat, threads with feathers suspended over the beds, and similar devices; but in corn-fields recourse must be had to the less effectual method of employing boys at particular seasons to frighten the flocks from alighting where they would do injury.

The twite or mountain linnet (*Fringilla montium*, Linn.), distinguished by its rump being of a red colour, is by no means so common as the other, but

is of not very dissimilar habits, feeding much in the same way, and requiring the precautions to prevent its depredations which have just been detailed. This bird is not much known except amongst naturalists, being popularly confounded with the common linnet.

The chaffinch or shilfa (*Fringilla spiza*) is one of our prettiest and best known native birds, not so bright and gay indeed as the goldfinch, but tastefully dressed (if I may use the expression) in a party-coloured suit of pale blue, olive, wine red, and white. These colours also are much set off by the sprightly movements of the bird as it flits about with great activity from the tree to the hedge, and from the hedge to the ground, in persevering pursuit of food, being a most voracious feeder, and not easily satisfied. It is one of the commonest of our hedge birds, being very hardy, and breeding twice or more during the summer. The nest being the neatest of all our British birds' nests, invites the plundering schoolboy, though the bird is not very frequently kept in cages here; while, on the continent, it is as great a favourite as the canary, and the species is so hunted by bird-catchers as to render them by no means plentiful in a wild state. Dr Bechstein says, that "the passion for this bird is carried to such an extent in Thuringia," and those which sing well are sought for with so much activity, that scarcely a single chaffinch that warbles tolerably can be found throughout the province. As soon as one arrives from a neighbouring country whose notes appear good, all the bird-catchers are after it, and do not give up the pursuit till they have taken it. In Ruhl, a large manufacturing town in Thuringia, the inhabitants, who are mostly cutlers, have such a passion for chaffinches, that some have gone ninety miles from home to take with bird-lime one of those birds distinguished by its song, and have given one of their cows for a fine songster; from which has arisen their usual proverb, such a chaffinch is worth a cow. A common workman will give as much as sixteen shillings for a chaffinch he admires, and will willingly live on bread and water to save the money for this purpose."

It would be well for our gardeners and farmers if this fancy for chaffinches were carried a little farther here, for a more destructive bird to growing crops and sown seeds could scarcely be named. The chaffinch seems to be most partial to hedges and orchards, but it may be found in all parts of the country wherever there is a bush or a tree; in the more open country as well as in the largest woods, varying some of its habits with the circumstances of the localities around it; for it will build its pretty nest in a low thorn bush about four feet from the ground, or in the fork of a tall elm five times that height; while it will sometimes place it on the face of a bare stump or branch, and at others conceal it in the thickest and leafiest part of a hawthorn.

The food of the chaffinch, however, is what requires our chief attention here, and on this subject there is some difference of opinion. When wild, according to Dr Bechstein, the food of these birds in spring consists of all sorts of insects, which they carry to their young in their beaks; while later in the season they eat various kinds of seeds, such as pine and fir seeds, when they inhabit forests that contain these; and in the fields, linseed, oats, rape, cabbage and lettuce. M. Montbelliard is more correct when he says the

parents feed their brood with caterpillars and insects, and also eat these themselves, though their ordinary subsistence is small seeds, such as those of the white thorn, poppy, burdock, the hips of roses, and especially beech, musk, hemp and rape seed. They feed also, he says, on wheat, and even on oats, and are expert at shelling the grain, to obtain the mealy substance. A recent periodical writer affirms that the chaffinch is "during summer entirely insectivorous," a palpable mistake; for though it feeds its young, as we have seen from M. Montbelliard, almost wholly on insects, the old birds always prefer vegetable food. Accordingly, in the earlier part of the year they look out for the seeds that are first ripe, such as [those of] groundsel, chick-weed, nail-wort (*Draba verna*), and the speedwells and dead nettles; and, when they cannot procure the seeds, eat the young shoots of these plants. The mistaken statement, that they are wholly insectivorous in summer, may have arisen from their being prolific breeders, and requiring, of course, a large supply of insects for their young. I recollect that when I was a school-boy I reared a young chaffinch from the nest, and, previous to its first moult, it eagerly devoured flies and other insects; but afterwards, though it retained its habit of snapping at every fly that came near it, and even of killing them, it always dropped them in the cage; and I never observed it to swallow any insect after this period.

The following observations by an excellent observer, the Rev. Mr Bree, are worthy of attention on the point in question. He tells us, that in the early part of summer his attention was attracted by a chaffinch, which, as he sat in his room, he remarked to pay repeated visits to a broom bush immediately in front of his window. The bird remained a considerable time in the bush at each visit, and appeared exceedingly busy about something, hopping from spray to spray, searching and rummaging among the branches, and evidently using his bill. This gave rise to the suspicion that the object of plunder was the young soft seeds of the broom, which were at the time much in the same state as green peas when they are fit to gather; but, upon examination, every pod was found to be whole and untouched. The bush, however, was smothered with plant lice (*Aphides*), and these insects were ascertained to be what had attracted the chaffinch, and not the seeds, as had been conjectured. There is little doubt that these plant-lice were carried off to feed a young brood, and not eaten by the bird itself.

During winter, it is probable, when seeds are scarce or covered with snow, that the chaffinch is compelled to become omnivorous like the tits, and to put up with whatever food it can most readily procure; and accordingly, in severe weather, these birds may be observed in numbers, crowding about compost heaps in the fields, where little can be found except the maggots of flies, or an occasional beetle. It may likewise be in pursuit of similar prey that chaffinches may be seen resorting to the tops of moss-grown walls, since even during cold frosty weather, particularly when the sun shines out, we may at times in such places see a lady-bird peep out from its drowsy retreat to ascertain whether the sunshine is really the announcement of spring.

These visits of the chaffinches in winter to the tops of mossy walls, however, have been differently explained. Mr Knapp tells us he has often thought that the chaffinch and some other birds obtain much of their support

in winter, and more especially when the ground is covered with snow, by feeding upon the capsules or fertile heads of various mosses, having frequently noticed them pecking and masticating something upon the walls, and in such places where these plants abound, and nothing besides that could afford sustenance to any animated creature. The various species of screw mosses (*Tortula*) perfect their capsules principally during those periods in which other seeds, at least in the pod, could sparingly be found. The object, he adds, of many of these early plants, has been considered as obscure, and their profusion a general subject of admiration; but if the preceding conjecture be correct, that they afford nourishment to these poor little birds in a season of destitution, it affords us another instance of the benevolence of the Creator, extending as far as we can perceive, through every department of creation.

Now all this may undoubtedly be true, though to me it appears somewhat doubtful, inasmuch as the contents of the capsules of mosses are so very small as to afford little nourishment; but on the walls and other places where such mosses grow, small phanerogamous plants, such as vernal nail-wort, often abound; and, though the plants may have died and disappeared, being annuals, the seeds for a future crop must be scattered about, and these the chaffinch knows well how to find, as, unfortunately, it does those which are sown in fields and gardens. This bird is indeed a most destructive pest in newly sown grounds to most sorts of seeds. In the nurseries, for example, the chaffinches search for and devour most sorts of the seeds of trees and shrubs the moment they are sown, such as those of the mountain-ash or rowan tree, the hawthorn, the fir, beech, and many others; and the beds must either be protected from their depredations by netting, or by some of the usual means of scaring birds, otherwise there will be little or no braird, and the seedsman may suffer serious reproach for furnishing bad seed when he is not in the least to blame. In the garden, the chaffinch is no less destructive to newly sown beds, both in the autumn and spring, particularly those of lettuce, cabbage, cauliflower, broccoli, turnips, and radishes. These birds will also nip off the seed-leaves as soon as the braird appears, after which they will not touch the plants till the seeds begin to ripen, when their depredations are renewed. How Mr Jesse could rank the chaffinch among "harmless" birds, I cannot conjecture, as its pertinacity in plundering is well known to every gardener. It is, however, very easily scared by any of the usual means, and no garden crop will be touched by it if proper precautions be timely taken.

Amongst other injuries done by chaffinches, I must not omit that these birds, as Mr Knapp correctly states, make sad havoc with some of our spring flowers; and the polyanthus in March, in our sheltered borders, is very commonly stripped of all its blossoms by these little plunderers, probably to obtain the immature seeds at the base of their tubes. They often also defoliate the spikes or whorls of that common weed, red dead nettle or archangel (*Lamium purpureum*); and they may be seen in spring with their bills filled with the green seeds of this early flowering plant.

The mountain finch, or brambling (*Fringilla montifringilla*), is so very similar in general appearance to the chaffinch, as to be readily confounded with it by those who have little knowledge of ornithology. Its call-notes also are so like, that it may be taken with a chaffinch for a call bird. It is stated to be pretty

common in Yorkshire during winter, associating in flocks with the chaffinches. It is much less common here, however, than on the continent. In Thuringia, Dr Bechstein says they assemble in flocks, reckoned at about one hundred thousand, to feed on beech-mast; and, in 1763, more than six hundred dozen were killed daily near Sarbourg.

The bulfinch (*Loxia pyrrhula*, Linn.), though a favourite cage-bird, and, when taught to whistle tunes, sold at a high price, has no claims to regard in its wild state, and may well rank as a decidedly destructive bird. Bewick, indeed, tells us, that it frequents gardens in the spring, where it is usefully busy in destroying the worms which are lodged in the tender buds. The bulfinch, however, does not destroy worms nor any species of insect, as it does not eat any food of this sort; and if it did destroy the worms lodged in the buds, it must destroy the buds before it could get at them. Conjectures of this kind (for this is mere conjecture), are almost certain to be incorrect, and are easily disproved by investigation. Dr Townson, not contented with the mere observation of the actions of the birds, opened the stomachs of two bulfinches which had been shot in a cherry-tree, in the month of February, and, exclusively of a few grains of sand, and some small pebbles, found nothing but the cores of flower-buds, consisting of embryo flowers, and, with the assistance of a magnifying glass, he could ascertain all the parts of the blossoms. "The mischief," he says, "these two little epicures had done, and probably at one breakfast, is incredible. From the quantity of buds I found in their stomachs, each of which buds was composed of four or five flowers, I think they had not eaten less than a thousand a piece." Even at half this rate of eating, a few hundred bulfinches would disbud the largest orchards to a most injurious extent.

The ingenious journalist, whom I have so often referred to, without apparently being aware of the explicit facts just stated, gives a most minute and accurate account of the proceedings of the bulfinch in disbudding trees. The notion, he tells us, that the bulfinch attacks only such buds as contain the embryo of an insect, is certainly not correct, or if such a benefit is conferred, it is not with the intention of eating the insect. The injuries done by these birds, indeed, are more than is commonly supposed, for on looking beneath the trees or bushes where they have been feeding, the ground will be seen to be strewed with the envelopes of the buds, which they shell off as they do the husks of seeds.

In severe snowy weather the bulfinch feeds chiefly on the hips of the wild roses; but when these are exhausted or destroyed, it resorts to orchards and gardens, to feed on the blossom buds of trees, and, in selecting these, we are told by the same author, that it is very choice and dainty, seldom feeding upon two kinds at the same time. For the most part it begins with the swelling buds of the largest and most early gooseberries. A small flock of about half a dozen may thus be seen going regularly over every gooseberry bush in a garden once a-day for a week or so, till few of the best formed buds escape harm, and, of course, the crop is destroyed for that season. When the gooseberry buds are finished, they next attack the cherries, with which they make tremendous havoc. Our author has an early wall cherry, that has for years been a favourite with the bulfinch family, and its excellence seems to have been handed down to each successive generation. It buds profusely, but is

annually stripped of its promise by the spring visits of the bulfinches, before the blossoms expand. These birds next attack the blossoms of the plum trees, but not those of peaches or apricots, and, when these are exhausted, they go to the sloe trees in the hedges.

Another writer says, "I saw a bulfinch alight on a cherry-tree, and before I could charge a gun, he had completely stripped every blossom bud from one long branch." This branch bore no fruit, of course, but all the rest of the branches on the same tree bore plentifully. More distinct proof could not be adduced.

The attacks of these destructive birds are not always confined to fruit-trees, for they will frequently run over every bush in the shrubbery, and devour thousands of the blossom buds of flowering shrubs, particularly the lilac, the Tartarian honeysuckle, and the Japan corchorus. They will also eat off, particularly in severe weather, the leaves of carnations, though they are not so fond of alighting low down, like the sparrow. Dr Bechstein says they relish the pips of apples, but it is doubtful whether, in a wild state, they peck into the fruit to get at these.

I am not aware whether the bulfinches can be easily scared by any of the usual means; but in places exposed to their depredations, if none of these succeed upon trial, recourse must be had to the gun, and, in this way, they may easily be kept under, as they are nowhere in very great numbers. I have observed that in Scotland they increase rapidly, where plantations of fir have been made, as they are fond of the seeds, and prefer the broad platform of a silver fir branch for their nest.

The house-sparrow (*Passer domesticus*, Ray), is by far the most mischievous of the smaller birds which have hitherto come under our notice, and, from its being an exceedingly prolific breeder, and omnivorous as to food, its numbers, in most parts of the country, are very great. One pair of birds will often rear no fewer than fifteen young ones in the course of a season, and as they build out of the reach of danger, these seldom meet with accidents in the earlier stage of their existence. It is thus, accordingly, that the numerous flocks are produced, which we see collect in the hedges and trees, to make their descent into fields and gardens, which they plunder without mercy, often to a most ruinous extent, than most previous observers have been aware of, as I hope I shall be able satisfactorily to prove. It is rather a singular circumstance that the greater number of writers on natural history undertake the defence of the sparrow against what they term popular prejudices, but, like most partizans for a particular side of a question, they are apt to prove too much, or to overrate supposed benefits, and underrate supposed damage. It may be as well to state one or two of the arguments usually adduced in favour of the sparrow, and point out their fallacy.

The basis of the usual arguments of the advocates for sparrows are such as the following, which I take from a common work on ornithology: "The ignorant," says the writer, "ever ready to judge from superficial observation, have condemned the sparrow, because it feeds on the produce of the farmer, as a most noxious bird, fit only to be extirpated. It is to be recollected, however, that insects form no inconsiderable part of the food of these birds. Bradley, in his *Treatise on Husbandry and Gardening*, has proved by actual ob-

servation, that a pair of sparrows, during the time they had young, carried to the nest forty caterpillars in one hour; and supposing them employed with equal diligence for twelve hours a-day, they will in one week consume the astonishing number of 3360 caterpillars. Thus an all-wise Providence checks the inordinate increase of insects; which, however useful in themselves, would, if left unmolested, propagate with such rapidity, as to consume the vegetable productions of the earth, and leave it a desert waste."

Another writer, who is more partial to imagining facts than proving them from observation, is pleased to inform us, that "the house-sparrow does more good by destroying the house-fly and the cabbage butterfly, than it does injury to gardens or to field crops." We might very safely, I think, offer to pay a sovereign for every house-fly or cabbage butterfly proved to be caught by sparrows; for though they will carry off to their young the smooth caterpillars, but not the hairy ones of the cabbage butterfly (*Pontia Brassicae*), as well as the grubs and pupæ of the flies, they will not touch the full-grown insects. His proof is, that sparrows are said to be trained to catch butterflies in Persia; but though some bird called a sparrow may be thus trained, it does not follow that it is the house-sparrow.

In his third series of Gleanings, Mr Jesse says, "that there is a custom in the village in which I at present reside, and, I believe, in most others in England, for the churchwardens to give a certain sum of money for every dozen heads of sparrows which are brought to them. I verily believe, however, that the worthy churchwardens are grievously imposed upon, as I hear of the heads of *chaffinches*, *tomtits*, and other harmless birds, being substituted for them. Be this as it may, my object now is to endeavour to rescue the sparrow from the odium it has long been under of doing great injury to the farmer. That it will feed on corn and peas there can be no doubt; but this may be in a great measure prevented by setting boys to watch during the short space the corn is ripe. With this exception, I believe sparrows are of the greatest utility to the farmer, devouring myriads of insects, which would otherwise do him infinite injury: this is particularly the case when they have young ones, all of which are fed with insects and caterpillars; and I feel convinced that they would not have been so generally distributed, over most parts of the world, had they not been intended for some useful purpose; indeed, many observant persons are now aware, that, in places where sparrows have been destroyed, some sorts of fruit-trees have been stripped of their leaves by caterpillars."

Dr Bechstein, in the same spirit says, "if, unfortunately, it is too true that sparrows cause great injury in ripe fields of wheat, barley, and peas, it must be acknowledged that they are very useful in our orchards and gardens, by destroying in the spring thousands of insects on which they feed their young." His French translator adds, that "the destruction of sparrows has been so great an evil in the countries where the government had ordered it, that it has been found necessary to rescind the order."

Mr Knapp again tells us, "sparrows seem to be appointed by Nature as one of the agents, for keeping from undue increase another race of creatures, and by their prolificacy they accomplish it. In the spring and early part of summer, before the corn becomes ripe, they are insectivorous, and their

constantly increasing families require an unceasing supply of food. We see them every minute of the day in continual progress, flying from the nest for a supply, and returning with rapid wing with a grub, a caterpillar, or some reptile; and the numbers captured by them in the course of these travels are incredibly numerous, keeping under the increase of these races, and making ample restitution for their plunderings and thefts."

This account, though by much too favourable to the sparrow, is nearer the truth than any of the preceding; but the following which not only exculpates the sparrow by a gross misstatement, but attacks the redbreast, contains as many errors as lines.

"Country gentlemen," says the writer, "complain of their fruit being devoured by birds, and orders are given for an indiscriminate destruction of birds' nests: sparrows more especially, are persecuted without mercy, as being the chief aggressors; while the robin redbreast, conceived to be the most innocent inhabitant of the garden, is fostered and protected. Now a little acquaintance with the natural history of these two birds would set their characters in opposite lights. The sparrows, more especially in country situations, very rarely frequent the garden; because, grain being their chief food, they search for it round the farm-yard, the rick, and the stable: They resort to such situations accordingly. The robins, on the other hand, are the great devourers of the small fruits; they come from the nest just before the currants are ripe; and they immediately spread themselves over the adjacent gardens, which they do not quit so long as there is any thing to pillage. It may appear strange that no writers on our native birds should have been aware of these facts; but it is only a proof how little those persons who are, nevertheless, interested in knowing such things, attend to the habits and economy of beings continually before their eyes." Our former paper sets the character of the redbreast in its true light: this gentleman, however, is noted for his errors on practical subjects.

Another theory has been recently broached in defence of the sparrow and other seed-eating birds, by a fanciful writer who says, "that each bird (finch) eats 100 seeds every day, by no means an extravagant calculation; which, however, gives to each the prevention of 36,500 weeds every year. The birds cannot be numbered; but when the vast flocks which are seen every where are considered, a hundred millions must be greatly below the actual number. That would give the immense prevention of weeds by the finches alone at the astonishing number of 3,650,000,000,000. Say that each weed would, upon an average, occupy a square inch (and many of them occupy 100 square inches) and the quantity of land which the finches annually prevent from being overrun, is little short of 600,000 acres, or more than one-seventh part of the total surface of England and Wales, whether cultivated or uncultivated."

"Countries," he adds, "where the weeds get the better of the little birds, are in a sure progress of sterility. The settlers on the northern shores of Lake Ontario in Canada, know what it is to have fields overrun with the Canadian thistle; and in many parts of the north of Scotland where there were no bushes for birds, were sadly infested with the common field marigold, before belts and coyses began to be planted."

A very easy method of settling these points would be, to leave the sparrows and the other birds unmolested to free the cabbages from caterpillars, the houses from the plague of flies, and the fields and gardens from weeds; but every body who ever had a garden knows that in certain seasons favourable to their breeding, the cabbages and other growing crops will be devoured by caterpillars, and without careful weeding the beds will be overgrown with weeds where the sparrows and other birds are even unusually numerous. In a garden, for example, adjacent to where I am now writing, daily visited by hundreds of sparrows, while extensive damage is done by them to many of the crops, the cabbages in summer were very much eaten by caterpillars, and above all the groundsel and other weeds grew as closely as if they had been sown on purpose. In my own garden, it required great care and assiduity to keep down the weeds, and to clear away the caterpillars by hand picking: the sparrows would never have kept them under, and every practical man must laugh at the utter absurdity of such a fancy which could only have been devised in the closet. Mr Bradley's calculation indeed looks something like fact; but instead of giving the sparrows twelve hours, he would have been nearer the truth if he had limited it to half the number, and this would very greatly reduce his estimate. Buffon, so often improperly blamed for his inaccuracy, would have set those fanciers right respecting the sparrow, had they taken the trouble to consult him. "Persons," he says, "who had kept them in cages assured him, that a single pair of sparrows consume nearly twenty pounds weight of corn every year; and taking this and their prodigious numbers into consideration, what enormous destruction must they make over our fields; for though they feed their young with insects, they chiefly subsist on the best grain. They follow the sower in seed time, and the reaper in harvest; they attend the thrashers at the barns, and the poulterer when he scatters grain to his fowls; they visit the pigeon-houses and pierce the craw of the young pigeons to extract the food; they also eat bees and are thus disposed to destroy the only insects useful to man."

A practical writer says justly, that "small as these birds appear to be, their consumption of grain in the fields both in seed time and harvest, is very great; they, very often, taking almost every grain all round the field to the breadth of eight or ten feet, and frequently to as many yards, while their destruction of the roofs of thatched buildings is perceptible to every one." It is no trifling loss to a corn grower, to lose the quantity of grain which these birds consume in the corn stacks in the farm-yard; and he is of opinion that each bird will eat its own weight of corn daily. He has known, he says, as many as 3000 caught in a single day on one farm with a net, and suppose we allow two ounces for the average weight of each bird, the consumption daily would be about ten bushels of corn for that number of birds.

A periodical writer says that a few years ago he was surprised to see the snow under a May-duke cherry, covered with the husks of buds which he ascertained to have been done by the sparrows, and, had they not been prevented, they would have taken the whole. The birds, says the same writer, uniformly take off all my plum crop, as well as the gooseberries and currants, and frequently the cherries. He remarked for several years, that he scarcely saw a green grape from two trees at the lower part of his garden, while he

usually had some in a favourable season on a tree near the house : he also observed, that all the fruit buds were regularly taken off the finer sorts of gooseberries, while the smaller and common kinds escaped, no doubt from the larger buds proving more tempting than the smaller.

I find, indeed, that even in the mildest winters, the sparrows extensively disbud the trees and shrubs in my garden, more particularly the red or white currant buds, though they seldom if ever touch those of the black currant. The blossom buds of the lilac are also occasionally attacked. A pair of sparrows, indeed, will do more damage in this way in an hour than all the caterpillars hatched on these trees in the most prolific years will do in a whole season. Miller remarks, long ago, that the sparrows also disbud the carnations, picotees, and pinks, and I observed, last spring, that they not only devoured the buds, but the younger leaves of carnations, leaving on some plants little besides the naked stumps. At first, on observing the circumstance, I imagined the leaves had been eaten by cats, as they had eaten down a clump of garden grass near at hand, till I repeatedly saw the sparrows nibbling at the carnations with their sharp-edged bills, that cut like a pair of scissors, and whether it is buds or grain, they can with such an instrument readily get at the core, which alone they eat.

But though all these are serious depredations, they appear to me not to be so injurious as another which is little noticed—the destruction of the braid of field and garden plants, by cutting off the seed-leaves the instant they come through the ground. Every gardener and farmer knows that sparrows destroy great quantities of seed after it has been sown, particularly spinage, lettuce, radish, turnip, and cabbage; but when these plants come up, the depredations of the sparrows are increased rather than diminished, though the snails, slugs, and caterpillars usually get credit for the damage. It was, indeed, some time before I could convince myself it was the sparrows that ate off whole rows of my pease and spinage, and beds of radishes and seedling cabbage, being rather pleased to see them alighting on the braids, thinking the opinion right that they were clearing away insects. A single experiment proved that the sparrows were indubitably the aggressors. Threads studded with feathers were stretched across the beds, which so effectually scared the sparrows, that they never ventured again to alight upon them, and the seedling plants grew undisturbed, while other beds left unprotected were as before entirely stript of the plants. Pigeons will do the same both with pease, lettuce, and spinage, but they are not worse than the sparrows.

The turnip-fly, it is but too well known, does extensive damage to the turnip crops in the seed leaf; but I have not a doubt that the fly is frequently accused when there is no fly to be found, in the same way as I accused the slugs and caterpillars of eating my young cabbages, lettuce, and radishes. The field crops of turnips, indeed, appear in their seed-leaf just about the time when the sparrows begin to collect in numerous flocks in the hedges, and as one sparrow will nip off several dozen seedling turnips at a meal, the damage done by a flock of fifty or a hundred resorting every day to a turnip field must be immense. I do not speak from conjecture; I had a bed of turnips in my garden the last spring entirely eaten off by the sparrows, before I was aware of the cause, and I recollect that a year or two ago a neighbour had

a similar loss, which he attributed to the fly, but though I myself carefully looked over this bed two or three times a day to discover the fly, I never observed one. I have not the slightest doubt that it was the sparrows alone. I cannot too strongly impress this upon the attention of turnip growers.

Taking the preceding details into consideration, it is much to be wished that some effectual method could be devised for preventing the depredations of sparrows. One effectual mode of diminishing their numbers is to catch them in a net at night when they roost by whole companies in ricks and stacks, or in a large trap net with a decoy bird, in both which ways I have known hundreds taken in a few hours. Many may be killed at a single shot by scattering corn in a long train, and firing at them while feeding.

Count Buffon having been told that if sulphur were smoked under trees where the sparrows sleep at night they would be suffocated and drop dead; he tried the experiment, but without success, though he took much pains and was interested in the issue, as he could not get them driven from the neighbourhood of his voleries. He placed on a wall covered with great Indian chestnuts, where the sparrows assembled every evening in great numbers, pots filled with sulphur, mixed with a little charcoal and rosin, and these substances being set on fire, caused a thick smoke, which had no other effect than to awaken the birds. As the volume ascended, they removed to the tops of the trees, and then retired to the neighbouring houses, but not one dropped.

Imagining that the sparrows might readily be poisoned, I mixed some arsenic with oatmeal, and strewed it in the paths between the beds of seedlings which they were daily devouring, but they never touched the poison, and my experiment was as unsuccessful as that of Buffon's with the sulphur. Others, however, have used arsenic successfully, in particular, Mr Stafford, gardener to R. Arkwright, Esq. of Crawford, Derbyshire. His account is too interesting to suffer abridgment.

"About twenty-six years ago," he says, "I went to live at Swinfir House, near Lichfield: it was surrounded by a rookery, containing many thousand nests, under which the sparrows built their nests, or rather formed habitations amongst the inequalities of the small wood that formed the foundations of the rooks' nests. Such were the numbers of the sparrows, that I soon found, both from reports and by my own experience, that nothing upon which they feed escaped destruction. I mentioned to a relation of mine the havoc which these birds made on my crops of peas, particularly when in a green state, and fit for the table, and he recommended me to make use of the following method for their extirpation:

"Take a flat earthen dish (a flowerpot-feeder will do), in which put a quantity of soaked bread, and place it on the garden wall, or in some place where no domestic animal will be likely to get at it. By paying attention to keeping up a supply, the sparrows will attend quite regularly to be fed; then about the sixth or eighth day, mix a small quantity of white arsenic with the bread. This, as well as their other food, should be given early in the morning, and before night its effects will be visible both on the old and the young ones.

"The first time I tried it," Mr Stafford continues, "every part of the garden and buildings exhibited its power, in the number of dead and dying birds, and before three days had elapsed, their destruction was so complete

that I could scarcely hear one about the premises. My curiosity led me to examine the ground under the rooks' nests, which I found thickly strewed with the young sparrows, thrown out of the nests as soon as life had become extinct. This method I practised for the five years I was with the Swinfin family, and always with the same success. I likewise recommended many farmers to try its effects, who all found it to exceed their expectations. A neighbouring clergyman applied to me, one morning, for a little of the mixture, and, before the evening, he desired me to go and witness the destruction it had made. I have since felt warranted in recommending it whenever I had an opportunity; and, after twenty-five years' experience, I feel anxious to communicate it to the public, well knowing that, in many instances, the loss occasioned by these birds is more than equal to a tenth of the crop, and I think that most practical men who have made observations on the corn-fields at the time of harvest, will be of the same opinion. If the whole of a parish were to put the above plan into operation in the month of June, I make no doubt that almost every sparrow might be destroyed; and, when we take into consideration the great sums paid annually in some parishes to persons who undertake to destroy these birds, I think the method here explained will be found to be not only the best, but likewise the cheapest."

It is but right to mention, that some who have tried Mr Stafford's method of poisoning the sparrows, have not found it succeed; and one gentleman who was disappointed in it, and having a large kitchen garden much infested with sparrows and chaffinches, was induced to go to considerable trouble and expense to prevent their ravages. He caused his labourers, when not otherwise employed, to prepare rods of wood about two inches broad, an inch and a half thick, and ten or twelve feet long, joining them together at the ends with similar rods, nine feet long, and, in the centre of the same, a similar rod to strengthen it. This frame is then wired with copper-wire, close enough to prevent the birds getting through. The frame thus prepared is raised over the beds upon pieces of wood six inches long,—one piece at each corner of the frame, and one in the centre. Wire is likewise passed around these pieces of wood to prevent the birds getting in at the sides. He says it is much cheaper than netting, and more sightly than matting.

These wire-frames must prove effectual, but few would like the expense and trouble who could avoid it, and I am convinced, from my own experience, that threads, with feathers or bits of paper tied along, and suspended so as to dangle over the beds, will prove effective in scaring both sparrows and chaffinches, which, with all their pert impudence, are exceedingly wary and fearful of danger. A coat and hat stuffed with straw so as to have some resemblance to a man, will not intimidate them so effectually as the thread and feathers. A neighbour of mine once set up such a man of straw in a cherry-tree to scare the sparrows from the ripe cherries, among which they were making sad havock, but, after the first day or two, when the novelty wore off, they alighted close to it and devoured the cherries as before. Netting, in such cases, is the only effectual preventive, and unless threads and feathers, which I have not tried, might do, netting, or tying up the bunches in gauze or thin muslin bags, is the only way of protecting ripe grapes on the open

walls, of which sparrows are very fond, and devour great quantities, always selecting the largest and the ripest, and sadly disfiguring the bunches. Should any person choose to try the thread and feathers, it ought to be fixed at some little distance from the fruit on the wall, so as to allow the feathers to move freely, as it appears to be their motion which intimidates the sparrows. White worsted threads, without feathers or paper, will scare them from peas or spinage, for a short time in spring, though they soon become familiar with this, but I have never found that they venture near when feathers or paper are used.

The tree-sparrow (*Passer montana*, Ray) is somewhat similar in appearance to the house-sparrow; sufficiently so to be popularly confounded therewith, but very different in habits. I do not mean by the tree-sparrows those which build large nests high on the branches of trees; these are only house-sparrows. The tree-sparrow always builds in the holes of trees, at a little distance from the ground, which the house-sparrow rarely, if ever, does. The tree-sparrow has the throat, and a spot behind the eyes, black, and the sides of the head white, while the house-sparrow is black all round the eyes. The wings again, in the tree-sparrow, have two white cross bands, while the house-sparrow has only one. The tree-sparrow is by no means common, though it is plentiful in Yorkshire and some other localities. It never comes near houses, but frequents gardens, orchards, and fields abounding with trees and hedges. It is very lively and is in continual motion, but does not hop so awkwardly as the house-sparrow, fluttering along, and jerking its tail somewhat like a wagtail. It is not so pert as the house-sparrow, though it is not very shy, but will follow travellers on the roads, flying low, with a sort of wheeling motion. It is chiefly destructive in seed-time and harvest, when considerable flocks assemble and plunder the farm fields, more after the fashion of the linnets. Its depredations may be prevented by one or other of the plans already pointed out.

I have now gone over all the British hedge-birds which I think can be alleged to be injurious to field and garden crops; but, besides these, there are several other birds which commit depredations, but do not well come under the designation which stands at the head of this paper. Partridges, for example, and other game birds, never settle on hedges, and cannot be termed hedge-birds; and the magpie, though partly a hedge-bird, does little injury to crops, though it is otherwise injurious. The raven and the rook also merit especial notice; but, for the present, I have extended my remarks much farther than I had my idea of when I commenced, and must leave the crows and game for another communication.

J. R.

**HORTICULTURE—PEAS, BEANS, RADISHES, LETTUCE, CABBAGE,
ONIONS.**

By Mr TOWERS, C. M. H. S., Author of the Domestic Gardener's Manual.

THE *Pea* is one of the most delicious vegetables which our gardens produce; it is a universal favourite, and is grown abundantly by persons in every station of life; it is of ready culture, and very hardy, but there are points which ought to be investigated, in order to obviate certain inconveniences, and to promote larger crops with less danger of failure: these I shall shortly allude to.

Botanically—the *Pea*, *Pisum sativum*, belongs to the natural order *Leguminosæ*, and to its first suborder *Papilionaceæ*. In the Linnæan system we find it in Class XVII. Order IV. *Diadelphia Decandria*. Stamens 10, nine of the filaments are united for more than half their length into a semi-cylindrical keeled tube open on one side, but closed by the tenth filament, which is flat and awl-shaped. The essential character is found in the *style*, which is triangular, keeled above and downy. The two upper segments of the calyx are wider than the three lower. It is a native of the south of Europe, and was introduced to Britain at a period not known, nor perhaps now to be discovered. The species are few, but the varieties of the garden pea are very numerous, and capable of great extension, by hybridization. Some are highly valuable both for garden and field culture; none more so than the following, which afford ample choice for every appropriate season and situation.

It is but candid to observe, that the succeeding remarks apply to the climate of South Britain, a circumstance which I regret; nevertheless, the experienced cultivator in the north will be able, to make the required corrections without difficulty; the constitution of the plant is, in fact, so hardy, that it can adapt itself to almost any degree of transition; an assertion which the following anecdote will tend to establish. Three or four years since, I raised a few early frame peas in a hot-house, but the weather was so cold and ungenial, that I dared not transfer them to the open soil. The plants grew rapidly and became ‘drawn’: as an experiment, I cut them over very low, yet they sprouted vigorously afresh; and the season becoming much

milder, I one very fine morning removed them to an open border, with care not to injure the roots, also to bring the earth in close contact with them, raising it in a sort of ridge against the plants: two or three inches, however, of the stems remained unprotected. As evening advanced the temperature became much lower, and during night was reduced to three or four degrees of frost. In the course of twenty-four hours these peas * were subjected to a transition amounting to between thirty and forty degrees, immediately after the disturbance of their roots; yet they not only survived the severe frost, but produced a fair number of really good pods.

Approved varieties are the *Early Frame*, and *Early Charlton*, good bearers, which may be sown in October, November, and December, in single rows; and if the spring be propitious, they will produce moderate crops towards the close of May and the beginning of June; height three or four feet.

Early White Warwick, the new and most valuable pea alluded to in a former article:† it may likewise be sown in the autumn, and will come into bearing in a period as short as the nature of the season will by possibility permit. It is adapted also to medium and late crops; and possesses a high and peculiar flavour. The plants rarely exceed one yard in height. In the field they, of course, are never assisted by sticks, and are planted in rows, about a foot or sixteen inches asunder.

Bishop's Early Dwarf, a neat little pea, decorated with blossom from the soil to the extreme point of the stems, which rise little more than a foot high. The pods are small, and contain but a few seeds; the variety indeed is more curious than useful; and is not so early as the Warwick; I have noticed it, because I find that is a great favourite with some persons.

* It is usual to write the plural of pea *pease*; I object to this orthography, as I deem the latter word to be expressive of an "adjective" quality, as *pease-pudding*, *pease-soup*, *pease-straw*, and not of *plurality*; "*peas*" surely is correct, pea *sing.* peas *plur.* not *pease*.—TOWERS.

All lexicographers of authority spell the *plural* of pea, *peas*; and the spelling, *pease*, is used by them to denote the kind of seed in contradistinction to other seeds. Why the distinctive difference is made in the orthography the same authorities are silent, but it certainly exhibits the beautiful variety of our language.—EDITOR.

Vol. vii. page 84.

Spanish Dwarf grows from eighteen inches, to two feet high ; is of a close compact habit, peculiarly suitable to dry seasons, and to districts frequently visited by high winds ; it yields well for its size, and the flavour of the pea is pretty good, but it is not considered early.

Woodford's Marrow Pea, one of the most estimable of the new, or newly named, varieties ; height thirty inches, extremely prolific. Pods of medium size, seeds large, and full of a high flavoured, delicious pulp ; none can surpass it for general spring culture, unless it be the

Dwarf Blue Imperial. This indeed is surpassingly excellent. I know not its origin, but conceive it to be a hybrid between the Prussian-blue, and one of the marrow-fats. Height three feet, herbage rich, strong, and of a fine glaucous bluish tint ; that is, in situations and soil favourable to it ; but some complain that it does not prosper with them. I believe that it requires a soft, unctuous, and rather open loam, enriched with black vegetable earth, and not with common mixed manures. Season of sowing between February and June.

Prussian-blue.—A hardy and most fruitful variety, suitable to any climate ; to the field as well as the garden, for the middle crops. The fruit is a bluish grey when quite ripe, and not so large as that of the imperial. Of the taller growers, the *marrow-fats* and *rounceval* claim precedence ; but they are very inconvenient to the grower, and are liable to injury from high winds. One variety, however, merits particular notice, because it evinces the importance of cross impregnation ; I allude to

Knight's Tall Marrow-fat, the history of which may prove interesting to many who are not acquainted with its origin.

Mr Knight, the President of the London Horticultural Society, has described his experiments in the Philosophical Transactions of 1789. Two years preceding (1787) he had a degenerate sort of pea growing in his garden which was not restorable by attention and culture. "Being thus a good subject of experiment, the male organs of a dozen of its immature blossoms were destroyed, and the female organs left entire. When the blossoms had attained their mature state, the pollen of a very large and luxuriant pea was introduced into the one half of them, but not into the other. The pods of both grew equally, but the

seeds of the half that was unimpregnated withered away, without having augmented beyond the size which they had attained before the blossoms expanded. The seeds of the other half were augmented, and matured as in the ordinary process of impregnation, and exhibited no perceptible difference from those of other plants, of the same variety—perhaps because the external covering of the seed was furnished entirely by the female. But when they were made to vegetate in the succeeding spring, the effect of the experiment was obvious. The plants rose with great luxuriance, indicating in their stem, leaves, and fruit, the influence of this impregnation; the seeds produced were of a dark grey. By impregnating the flowers of this variety with the pollen of others the colour was again changed, and new varieties obtained, superior in every respect to the original on which the experiment was first made, and attaining in some cases a height of more than twelve feet.”

The *Sugar Pea* is not recommended for the ordinary uses of the table, but as forming a most excellent pickle. Its shell is destitute of that tough membrane which is found in other peas; hence the entire pod is occasionally cooked, and eaten with melted butter; it is extremely sweet, and on this account, as well as for the little resistance its husk opposes, birds devour the seeds rapaciously.

The foregoing list contains ample materials wherewith to form a very complete collection of peas; small families would require two or three varieties only, as for example, the white Warwick for the earliest and latest crops; because it vegetates speedily, and is quickly off the ground; and the Prussian blue, and Woodford's marrow, for the main summer crops.

The soil for peas ought to be a mellow, rather light, and sandy loam, enriched with vegetable compost, wood-ashes, and perhaps by a sprinkling of salt. In sowing the seeds, drills should be traced an inch and a half or two inches deep, and not less than a yard apart; they vegetate more perfectly, and the plants yield a better crop, when the seed is sown in long single rows; but space and situation will not always permit this to be done: the soil also becomes less contaminated than when single beds are planted.

The pea affords one of the strongest evidences of the truth

of the "*excretory theory*;" for not only does the root emit a most powerful specific odour, which fills the soil, but it produces a species of mouldy excrescence in great abundance,—in-somuch that, in shallow land, over chalk or marly loam, the pea refuses to vegetate, or at least to perfect its growth after three or four reiterated croppings. I have witnessed the entire failure of pea crops in land so saturated,—and in some districts the common people have a local term to express this specific poisoning of a soil—they say it is "*over-pea'd*."

: Not many weeks since, I had an opportunity to converse with one of the best kitchen gardeners in the kingdom, and observing a peculiar mode of cropping the borders, I made it the subject of minute inquiry. The *permanent* crop is the strawberry, planted in rows about a yard asunder, and retained strictly within its limits; between each row a crop of *early peas* is succeeded by one of *Cape Broccoli*; the ground is manured once a-year, and is kept in perfect heart and condition by this rotation. The gardener is a native of Scotland, a man of acute discernment, and who duly appreciates the facts which come under his observation. His experience had satisfied him that the broccoli took up and cleared the land from that peculiar matter which pervades it, when crop after crop of peas is sown; and hence that broccoli, and, I may add, the *brassica* tribe in general, become excellent successions to the pea, and perhaps to other leguminous vegetables.

Times of Sowing.—These must depend upon climate, and the object of the cultivator. Most persons affect an early crop of peas, and there are several methods by which the plants may be forwarded in their early progress. If the season be open, an October or November sowing may succeed perfectly; and it will not be improper to try a few drills of *frame* and *Warwick* varieties. The very finest crop of peas which I saw in the early part of the present year, was sown in November 1835, in one long drill, three or four feet in advance of a high wall, with a south aspect; there was scarcely a blank throughout thirty or more yards; the plants were closely supported and protected by small branchy sticks of the spruce fir; and where this material is to be had in abundance, its close, well-set and regular spray serves equally to protect the advancing plants again

the attacks of birds and frost. But peas sown early in the open ground, present but a very insecure promise of ultimate success: mice, birds, and insects assault them; alternations of temperature, profuse rains, swampy ground, and rigorous frosts, all combine to thin the plants, if not to destroy them altogether. Nothing can be safely effected till the end of February; for with the best winter treatment, a very great waste of seed must be anticipated. The most effectual remedy is found in a hot-bed frame and lights, simply supported on four bricks—one at each corner,—and furnished with a bed of good, light earth, six inches deep: a bank of coal-ashes might be placed around the frame, rising almost to the top of it, and sloping off at a pretty considerable angle. Seed sown thickly in such a bed, early in February, would vegetate perfectly; the lights, covered with a mat in the event of a severe frosty night, would afford ample protection, and the plants would rise slowly, yet securely, without any loss. It is well known that peas sown in the open ground become, as before observed, an easy prey to field-mice and birds; scarcely one-third of the seed produces perfect plants; whereas in a glazed frame, a quart of seed will yield an abundant crop, and cause a real saving. One objection, however, of some moment, may be started against the frame culture of peas; the plants must be taken up, and transplanted one by one, and the operation requires much time and attention. To obviate this objection, I would suggest an alteration in the mode of raising the peas; for as to the practice of *transplantation*, it is one of real utility, which, far from retarding the growth of the plants, promotes it, and brings them into bearing at a period comparatively early. The plan now to be proposed was first described to me by a young gardener who witnessed its success at one of the first gardens in Nottinghamshire.

A number of grass turfs, three inches thick, and of the same breadth, must be collected: their length, individually and collectively, determined by that of the row or rows of plants intended to be formed, and the convenience for bestowing the turfs. If twenty yards of plants be wanted, as many turfs may be cut; and it perhaps is desirable to cut them in such short lengths, as they will be found more manageable than long ones at the time of final planting out. Invert each turf, and

with a sharp knife cut a groove along its centre, about an inch and a half deep. One pint of "Warwick," "frame," or Charlton peas, will sow a row of twenty yards, and the same measure is considered amply sufficient to sow thirty yards of the imperials or marrow-fats. Drop the seeds one by one along the groove, to the extent of two or three in an inch, according to the variety, and then cover them with fine earth moderately enriched with leaf-mould, or perfectly decayed manure, filling up the groove, and pressing the earth firmly upon the seed. Place these planted turfs in a frame, or upon the floor of a vinery, or other convenient glazed structure. Air and moderate moisture must be attended to ; and with these, and a free exposure to light, the plants will rise freely and grow rapidly, without danger of being "drawn" up. If the peas be raised in a warm vinery, it will be prudent to harden the plants when grown an inch or two high, by removing the turfs to a frame, giving air freely in the forenoon particularly, and closing the lights in the evening, and whenever the weather is very cold and heavy rain falls. As soon as the ground becomes moderately dry, and the weather appears propitious, small trenches should be opened rather wider than the turfs, and an inch deeper, throwing the loose earth to the north or east side of the trenches. Drop the turfs into them, regulate them by the line, press earth close to their edges, and thus a complete row of peas will be formed at once, without that trouble of arranging and fixing every individual pea which must attend the practice of raising the seed in pots or beds of earth.* The loose earth from the trenches should be placed as ridges of defence, which will ward off in a degree the force of cold and piercing winds. Peas so planted out cannot be too early defended by low branchy sticks. These are of great benefit to the plants, which they greatly protect, and, I may say, excite ; for the pea being a climber, sends out its tendrils very early, and thus attains that perpendicular growth which nature ordains it to assume. Without it, the plant can be productive of fruit on one side only, to say nothing of the injury that it must receive when its

* We dare say this convenient method of transplanting peas in rows may not be known to farmers, and is worth their attention. The process was first described some years ago in the *Memoirs of the Caledonian Horticultural Society*.—EDITOR.

stem lies prostrate on the cold and damp surface of ground; which during the spring is frequently covered with hoarfrost.

Transplantation, I have said, accelerates the crop, but it refers chiefly to those sowing which are forced, or stimulated under glass. After the third week of March the sowings may be made in the open ground; and if plenty of garden traps be set about the beds, and the peas be closely sticked almost as soon as they rise, or have received their first hoeing, they will generally succeed perfectly.

It only remains to observe on the cultivation of peas generally, that, in order to have a regular succession during the season, a fresh sowing ought to be made, as soon as the plants of the one preceding shall be fairly above the surface of the soil: this holds good with respect to every variety which may be selected; and if there be plenty of space, an abundant supply may be secured. But the season will operate much in producing success, or the contrary; for if it be dry and parching, peas do very little good; and water, unless given profusely, is applied in vain. It is advisable to provide against consequences; and previous to sowing the seed, after the end of April, to drench the soil completely. In a day or two after this operation the surface will become sufficiently dry, and the drill may be formed to receive the seed, which would not be injured by another watering, before the earth is turned upon it. During the summer months, if rain do not follow speedily, and at short succeeding intervals, pea sowing is not likely to be successful, unless these copious waterings be resorted to; but with ground thus duly prepared, it has been proved that gatherings of the finest quality have been made during September, and even to the middle of October. At these periods, this vegetable is an extreme delicacy; and one which cannot be purchased in the market;* and, therefore, is worthy of the utmost attention.

The Bean, Vicia Faba, is another member of that comprehensive natural order, *Leguminosæ*,—and, as its family name imports, it belongs to the Vetch tribe. The flowers are papilionaceous; their colour chiefly white, or white tinted with

* There are plenty of peas in the vegetable markets in Scotland in Octo-

bluish-purple; a black spot is on the wings of most of the varieties, though one or two are free from it. The flowers are peculiarly and most gratefully fragrant: they are succeeded by pods, growing erect from the stems, and nearly without footstalks. The leaves are not furnished with tendrils. The plant is supposed to be a native of Egypt, and to have been introduced by the Romans. The bean abounds with a farinaceous pulp, and therefore is presumed to be highly nutritive. The horse-bean—a variety termed *V. Faba equina*—is found to be excellent food for horses, when blended with a considerable quantity of bran. A bushel of these beans are stated to yield about fourteen pounds of flour more than a bushel of oats. The garden varieties are rather numerous, but three or four of them are sufficient for any family. Some are esteemed for their precocity, others for their fertility, or excellence of flavour.

The Small Early Mazagan. The seeds may be sown for the earliest crops in October or November, and thence to the end of January, in a warm and sheltered situation, open, however, to the sun; but as beans transplant very well, it will be a good plan to select a small spot of ground about six feet square, and after digging and reducing the earth quite fine, to open small drills three inches asunder, and two inches deep, making them very even and solid at the bottom. In these the seeds are to be sown rather closely, that is about three inches apart, and covered with fine soil, which is to be pressed very firmly upon them. This small plot can easily be protected, either by a frame and lights, or by mats laid over hoops, placed archways over it. I have raised the larger beans in pots of earth, in the spring, and transplanted them, when five or six inches high, into drills, with perfect success. Give air freely to covered and protected beds; remove the coverings in mild weather;—in February, or early in March, if it appear settled;—transfer the plants to the open ground, prepared by manuring, digging, and pulverising. The drills should be two feet apart, and be made sufficiently deep to receive the mass of roots. The earth is then to be brought into close contact with the fibres, and raised two inches high about the stems.

The *Long-pod*.—The name expresses the appearance of the pod, which abounds with seeds of a medium size. It is a sure and prolific bearer, though not esteemed for its flavour, and is cultivated everywhere on account of its hardihood and fertility; and as it is suitable to the cottager, by bringing abundant crops at an early period, the absence of high flavour is deemed a secondary consideration. The seeds are sown in rows three feet asunder; the beans two or three inches deep, and four inches apart. Seed-time extends from the first week of February to end of May.

The *Sandwich* is a fine and fertile bean.

The *Broad-Windsor*, the best as respects flavour, but it is rarely prolific; sometimes the pod contains one seed only, frequently not more than two.

With a view to retain the rich, full flavour of this fine bean, but to render it prolific, it has occurred to me, that the object might be attained by hybridizing the two varieties; and I have this year attempted an experiment, on a new and rather large scale, which has yielded me a fair crop of seed, although the spring and early summer were droughty to a distressing degree. What the result may be, another season must determine; and if it be gratifying, I will not fail to describe my simple process very particularly.

Soil, and General Culture.—Beans prefer a rather strong, rich, and moist soil; but they will do pretty well in most kitchen-garden mould.

Drill-Sowing is the best method: the beans should be dropt regularly into the drills, at three, four, or five inches distance apart, according to the size of the seeds, and ordinary growth of the plants. The earth should be pressed firmly upon the beans; and as the plants advance, they should be moulded up a little, and the spaces between the rows kept free from weeds. Sowing after June must not be expected to produce much of a crop; those of February and March, if the season prove rather showery, always yield the best crops. When the plants grow large, and the blossoms expand, it will be prudent to nip off the tops, as it will tend to divert the nutritive fluids into the ripening pods, and frequently arrest the progress, if not wholly prevent the attacks of the black Aphis. When these baneful

insects have obtained complete possession, it will be wise to cut the plants down to within five or six inches of the soil; as then, they may be expected to push two or more healthy young stems.

The *quantity* of seed required for a row of eighty feet of the smaller early varieties, is about one pint, according to Abercrombie; for the main crops, where the beans are planted further apart, a somewhat less quantity may be sufficient. The rule given to regulate the sowing of *peas* for succession-crops is applicable to the present subject.

The vegetables which may be raised from seed, by sowings performed in January and February are:—*Peas* and *Beans*, as by the foregoing directions; *Radishes*, at different periods; *Lettuce*, a few of the hardy Cos, Dutch and Green Cabbage; *Cabbages*, the young plants of the summer sowing may be transplanted into open beds, if the work were omitted in the late autumn; *Onions* may be sown or raised from bulbs; the latter process I mean to describe in an early article; it is very interesting.

ON PURIFYING SALT MADE FROM SEA-WATER.

In the thirty-first number of this Journal, published in December 1835, I observe the following remarks, by Mr James Dickson, cattle-dealer, Edinburgh, in an essay "On the Application of the points by which Live-stock are judged."

"While alluding to the subject of salting beef," says Mr Dickson, "I cannot refrain from making a few observations on the quality of the salt which is in this country used for that purpose. It is well known that the salt manufactured in this country from sea-water is bitter and harsh to the taste. The rock-salt is not devoid of the bitter taste. The salt from St Ube's, or what is called Bay-salt, is somewhat similar, though not so pungent. The salt, on the other hand, which is manufactured from sea-water in Holland has not the slightest bitterness or harshness to the taste. It has a pleasant, pure, saline taste. It is crystallized

in large tables, is quite hard, and emits a jingling sound when handled in quantity. It is said that the Dutch possess some secret in purifying the salt after it is made, and to prevent this being made known, they will allow no stranger to visit this department of their salt-works. It has been suggested to bring a Dutch purifier of salt from Holland. But if there is really any secret unknown in this country, the Dutch government would not likely permit such an exportation. Now, it is well known that, in making salt from sea-water, the salt which is made on Sunday is very like Dutch salt, because on that day the water gets more time to evaporate. So that if more time were taken to make the salt, it would probably be as good as desired."

These remarks made by Mr Dickson are undoubtedly of great practical importance, and I am rather surprised that since the publication of them, none of your correspondents have noticed the subject.

I believe it will be found, that in Scotland we are not so much in want of sufficient science to enable us to purify salt, as that we are in want of Dutch habits of carefulness and accuracy, more especially in our domestic industry. We see annually that they make us eat thousands of tons of their poorest skimmed milk cheese, while at the same time they send us beautiful butter from the same milk, to the no small detriment of our own more slovenly dairies.

The bitterness of salt made from sea-water is caused by the adhesion to the salt of particles of magnesian salts which abound in sea-water. The magnesian salts are deliquescent, or attract moisture from the atmosphere. Common salt is not deliquescent, and would remain permanently dry, were it not mixed, in a certain degree, with those bitter magnesian salts which adhere to it. The Dutch salt, having none of these magnesian salts adhering to it, is hard and dry, and of the pure taste of good sea-salt (muriate of soda).

When sea-water is rapidly and violently boiled, till the sea-salt is deposited, and when that salt is immediately raked out from the *bittern* or magnesian liquor which remains in the salt-pan, the crystals are extremely small. Much of the *bittern*, or water-solution of magnesian salts, adheres to the small crystals

which form the salt sold and used in this country. It is, in general, the natural tendency of substances capable of being crystallized, that, while crystallizing, they throw off or expel from them every foreign substance. The liquor in a salt-pan that has been boiled on Saturday till the salt was ready to be deposited from the brine, is usually left without being removed till Monday. Hence it is allowed leisure to form large crystals of pure salt. But large bodies have less surface in proportion than small bodies; and therefore when the large crystals formed on Sunday are raked out from among the brine, less of the bitter salts adhere to them than to the ordinary salt hurriedly made during the week, and raked out in a state approaching to a powder. Large and well formed crystals, also, are not easily dissolved or affected by liquid bitter liquors which readily drains off from them; and impure sea-salt, that is to say, salt hurriedly prepared, may be purified, or, in other words, the bitter magnesian salts may be removed from it in two ways, 1st, By crystallization, and, 2d, By washing off the offensive bitter salt.

1. *To purify Common Salt by Crystallization.*—Take a quantity of sea-salt, and dissolve it completely in pure fresh water; then cause it to boil till it begin to deposit a little salt; then pour it into a broad shallow vessel, and place it in a situation to which there is free access of air. Let it stand at rest a few days, when it will form large crystals; rake out these from any liquor that remains; dissolve them anew in pure fresh water, and repeat the process till the crystals are equal to those of Dutch salt. This very simple process may be performed either on a small or on a great scale. We have no large establishment for refining salt, but it is clear that the public interest requires that such an establishment should be formed.

2. Common salt may be purified by washing off from it the bitter magnesian salts, thus: Spread upon a filter the salt meant to be used; the filter may be a cotton or linen cloth, or a tub with a bottom of iron-wire cloth: any animal substance would be speedily corroded. Next dissolve in fresh water a quantity of salt, taking care to saturate the water so, that it will dissolve no more. The salt to be dissolved, or made into strong brine,

ought to be not less than half the quantity placed on the filter, and meant to be used. The larger the quantity dissolved into brine, so much the better. Next pour the liquid brine, or dissolved salt, upon the dry salt on the filter, and wash the dry salt well with the brine. The dry salt on the filter will not be dissolved by this washing, but the bitter magnesian salts will be washed away from it. Repeat the washing, if thought necessary, with another quantity of brine made by dissolving salt in more fresh water. The brine that passes through the filter being left to stand in a shallow vessel for some days, will form large crystals equal to Sunday salt, and these may be used to purify more salt by dissolving them anew, and washing salt with the brine which they form.

The theory of the process is, that after water will dissolve no more sea-salt, it will still dissolve a considerable quantity of magnesian salts, and thereby remove them from the crystals of sea-salt to which they have adhered.

I have an indistinct idea, that many years ago, I read somewhere this last process, or a process founded on the same principle; but I am not certain of this, and cannot at present recollect any book in which it is to be found. It may probably be found in some of the agricultural works of the late Dr Anderson, publisher of the Bee, &c. In the mean while, I state the process as resting on well known chemical principles and practical operations.

Why does not the Highland Society adopt measures for erecting an establishment to refine salt? In vain do they give premiums for the manufacture of fine cheese and butter, or for rearing and feeding swine, or even beeves, so far as sea-stock is concerned, if we have not fine salt for our cheese, our butter, our pork, or our beef. Salt is like the cork of a bottle of wine. A bad cork will render worthless the best wine, and salt of inferior quality will diminish the marketable value of any article cured with it.

F.

ON THE AGRICULTURE OF THE COUNTY OF KERRY.

The kingdom* of Kerry (as it has been proudly designated) comprehends within its limits much of what was formerly called the Desmond territory, and contains more than a million of British acres. The county is divided into eight baronies, viz. Glancrougnt, Dunkerron, Iveragh, Magunihy, Truaghnamy, Cor-kaguiny, Clanmorris, and Iraghticonor.

The three first of these subdivisions include an extremely mountainous district, bounded on the east by the county of Cork, to which the only approach hitherto has been through the wild and romantic pass called the Priest's Leap; but a new road is now in progress from Kenmare to Bantry (in the latter county), which will tend materially to the civilization of a very wild and miserable tract.

The barony of Glancrougnt is principally the property of the Marquis of Lansdowne, who is considered a very indulgent landlord, seldom pressing for rent. Though arrears of two or three years' accumulation are not unfrequently due by his lordship's tenantry, yet, from the effects of the subletting system formerly practised on this estate, and the provoking indolence of the poorer classes, who have multiplied under the *fostering* care of middlemen, this portion of the county annually sends forth great numbers of itinerant mendicants, who migrate (between the periods of planting and digging out their potato crops) to the rich plains of Limerick and Tipperary in search of sustenance. As a characteristic instance of the indolent habits of the peasantry of this district (and we may add of the whole county), we shall state the result of our own personal observation (during the last year) of a family residing upon the new road between Kenmare and Killarney. We stopped to change the horses of the mail-car at the half-way house, where the highland scenery is magnificent, and for a few moments entered a cabin, in which the utmost misery prevailed: the inmates, consisting of the parents and five children, were breakfasting at half-past ten

* We do not mean any allusion to the Prince of Derrynane, in the Highlands of Iveragh. If *he* should be ever diademed, *all* Ireland will be little enough for him.

o'clock (this at midsummer) on very bad potatoes, with the accompaniment, however, of some milk ; two of the youngest children were without any clothes except tattered shirts of scanty length, and the youngest, an infant, was asleep in a small turkish. The parents themselves and the oldest girl were tolerably well clothed. The outside room where they were assembled presented a woful appearance of filth, and dampness of floor ; and were it not that, by a peep into the bed-room, we observed a good wooden chest, a bedstead, and some dirty blankets huddled together, with a little churn and a pail of milk, we should have left the house (judging from the nakedness of the kitchen), with the impression that there was not a single article of furniture under the roof. Now the owner of this house is one of three joint-stock tenants of a lot of unmeasured * land, for which they pay in rent and taxes L. 12 a-year. These joint tenants possess several cows, and pay the rent by the sale of butter, but are often too indolent to cultivate as much land as will supply a sufficient quantity of potatoes, although they have the advantage of limestone on the spot. The wife of the man whose case we are describing appeared quite content with her circumstances, and so much the worse, for, if she had felt the misery of her lot, industry and effort might easily improve it. She smilingly assured us that the naked youngsters did not feel the want of clothes in summer, and that they would have them before winter. In reply to an observation on the slothfulness which occasioned so late a breakfast, she replied that the children were kept asleep in bed as long as possible, in order to keep away the hunger, as they had but two meals in the course of the day. We ascertained subsequently that the labouring classes in this county feed but twice a day ! Even in the employment of the principal proprietors about Killarney, the workmen's bell rings but once in the day—for a single meal—at about half-past ten ; the second feeding hour is in the evening after the day's work. This is truly shocking, and accounts easily for the laziness and want of energy observable in the working classes of that country. But the proof of indolence with regard to the family at

* It is the usual practice in the mountainous or boggy parts of the south-west of Ireland to parcel out the land by the lump, and to estimate the amount of rent by the number of collops the tract is supposed capable of supporting.

the half-way house remains to be told. A rood of admirable garden soil is opposite their door, unfenced (except on the road side), undug, and undrained : one day's work would render it an excellent cabbage or potato garden, yet the lazy and thriftless occupier, who appeared to have nothing whatever else to do, would not take up a spade and cut a few drains in it ; though it has an inclination of one foot in ten, with a ditch at the edge of the road on the lower end, he assured us " it had not fall enough to carry the moisture off." What is to be done with people of this temperament, who will not help themselves ? We acquit the Marquis of Lansdowne of all harshness or inhumanity as a landlord, but we recommend his lordship to employ *practical* overseers, to employ the labouring poor on his estate in draining those tracts which so much need it, and in cultivating as much garden allotment as will afford at least good cabbages, which before the digging of new potatoes would often afford a good dish. The people should be *taught* to better their condition by actual example and unremitting superintendence, else their condition will remain such as it now is.

We understand that the Marquis is getting rid of the middlemen to whom the farms on his estate were formerly let, and that he is taking the sub-occupiers on every favourable opportunity as the actual tenants. This is as it should be, but these occupiers must be placed under good *management*, and instructed in those improved habits of rural industry, which are equally remunerative in result to landlord and tenant. Nor is there any difficulty in this undisturbed county in removing worthless and locating industrious tenants when necessary, for here agrarian outrages are unknown, ejectments are easily served, and there are always persons ready to pay up the arrears of a defaulter, and enter into the possession of his holding, if permitted by the landlord to do so.

The cottages about Kenmare, even among the hills, have a very improved appearance ; some of these are on the property of Mr Duckett, who is an indulgent landlord. The town of Kenmare will, it is hoped, become respectable, from the encouragement afforded by the noble proprietor to those who are disposed to build good houses, and from its connexion with the noble river of the same name. We had the mortification of see-

ing the neat quay built for the security and accommodation of trading boats without any vessels except a few sloops laden with potatoes from the county of Cork; and being sold at a very high price to the poor natives, who were taking them in panniers on the backs of ponies to the surrounding hills. Carts, however, have been introduced with great effect since the formation of the new road to Killarney; and that now in progress to Bantry will tend still more to the facilities of carriage.

The following extracts from Reports of Mr Griffiths to the Commissioners of Woods and Forests, shew the happy results of opening roads in the county of Kerry; they refer to other parts of the county, but are perfectly applicable here :—

“ Notwithstanding its present desolate state, this county contains in itself the seeds of future improvement and industry. Its clayey soil, when drained and manured with lime, soon becomes fertile, and produces excellent grass. The district is everywhere surrounded by limestone, and several hills containing that substance occur in the interior. Nothing, then, is wanting but good roads to make this county susceptible of the highest improvement. From returns which I have received from the weigh-house of Cork, it appears that upwards of 30,000 firkins of butter, present value about £52,000, are annually sent from the northern parts of the county of Kerry and the immediately adjoining district of the county of Limerick, to be sold at Cork. In order to save the great length of road by Tralee and Killarney, the small farmers are in the habit, during the summer season, of sending their butter, on the backs of horses, by the present mountain-path as far as Newmarket, where a few join together and place the butter on carts in which it is drawn to Cork. The distance between Newmarket and Listowel, the nearest part from whence the butter is sent, is nearly thirty-two miles British; and for this distance from eight to twelve horses, and as many men, are employed to convey twenty-four firkins of butter, the common load for a single horse-cart. Similar facts might be stated respecting other species of agricultural produce, were it necessary to particularise them.

“ It now becomes my pleasing task to describe the improvements which have been effected since I first commenced laying out the new roads through this neglected district. The object of the Government was to open the country, so as to render it generally accessible, and for this purpose the main lines of new roads were determined on; one to run nearly in a north and south direction, from the village of Newmarket, in the county of Cork, to Listowel, in the county of Kerry, a distance of thirty-two miles; a second, at right angles to the first, and nearly in an east and west direction, from Newcastle, in the county of Limerick, by the small village of Abbeyfeale, to the town of Castle Island, in the county of Kerry, a distance of twenty-nine miles; and a third, also in an east and west direction, twenty miles to the south of the second, from Newmarket, in the county of Cork, for a length of fourteen miles, towards Charleville, in the same county; making a total of seventy-

five and a half miles of new road. The whole of these new roads have been completed, and are now open to the public. At the commencement of the works the people flocked to them, from all quarters, seeking employment at any rate, which might be offered; their general appearance bespoke extreme poverty, their looks were haggard, and their clothing wretched; they rarely possessed any tools or implements of husbandry beyond a very small, ill-made spade; and, as might be expected under such circumstances, nearly the whole face of the country was unimproved and in a state of nature; but since the completion of the roads, rapid strides have been made towards cultivation and improvement: upwards of sixty new lime-kilns have been built, for the purpose of burning lime for agriculture; within the last two years, carts, ploughs, and harrows of superior construction, and other agricultural implements, have become common; new houses, of a better class, have been built or are building, in great numbers in the vicinity of the new roads, and also in the villages of Newmarket, Castle Island, and Abbeyfeale; new inclosures of mountain-farms are being made in every direction: and this county, which within the last seven years was the theatre of lawless outrage, and residence of what might be termed the rebel army, has become perfectly tranquil, and exhibits a scene of industry and exertion, at once pleasing and remarkable. To the credit of the inhabitants, I might say, that a large portion of money received by them for labour on the roads, has been husbanded with care, and subsequently laid out in building substantial houses, and in the purchase of cattle and implements of husbandry; and numerous examples might be adduced of poor labourers possessing neither money, houses, or lands, when first employed on the public roads, who within the last year have been able to take farms, build houses, and stock their lands with cows and young cattle."

There is a nursery of ten acres on the verge of the town of Kenmare, which is kept by the Marquis of Lansdowne for the use of his tenants. It is surrounded by a wall nine feet high, and is subdivided by hedges of beech and gravel walks, which are neatly kept under the directions of the nurseryman, whose house is adjoining. Unhappily a taste for planting does not prevail much in this neighbourhood. The River Blackwater (there are two rivers of this name in the south of Ireland) falls into the Kenmare a few miles below the town, at a very picturesque spot, where salmon and trout are abundant, as indeed is the case in all the Kerry rivers and lakes.

The barony of *Dunkerron*, which takes its name from an ancient castle on the river Kenmare, is exceedingly mountainous: it extends twenty-five miles from east to west, yet has not even a village worth notice within its boundaries; its population being scattered in detached cabins, or in little hamlets, along the coast. In this barony are the residences of two gentlemen

named Mahony, one of whom, more than twenty years ago, experienced the efficacy of salt in preserving from the rot a very large flock of sheep which used to be pastured on his wet mountain-land. The allowance of salt was very limited, not exceeding four ounces once a fortnight to each sheep: the use of this preservative having been discontinued for a year, the entire flock, consisting of 400, died unsound within another twelve-month. Many portions of the mountains here are well suited to sheep, which are, however, stated to suffer woefully in the lambing season from the attacks of foxes and eagles. The barbarous custom of shearing twice a year formerly prevailed here, the wretched sheep being turned out without their wool in the severe month of November upon a bleak mountain! We believe that this terrible practice, "more honoured in the breach than in the observance," has been discontinued; it was more likely to thin the ranks of the flock than the more natural and justifiable assaults of *brute* beasts and birds of prey.

The great inattention in Ireland to the draining of mountain-land (as we have had former occasions of remarking) is as surprising as it appears inexcusable in situations obviously inviting this essential mode of improvement. The inclined planes, as the traveller descends to Kenmare from the Killarney road, are existing evidence of provoking negligence and sloth. From Kenmare to Four-mile Water, by Cappanacushy, there is a good deal of arable land, with bog interspersed, and a vein of limestone for a few miles; the soil is a shallow clay-loam or slate-rock. Near Kenmare sea-weed and sand are the manures principally used, though lime is abundant; the poor peasant has the one for the mere labour of drawing, which he estimates at little or nothing, while for the other he must pay: or perhaps he prefers a lounging walk after his horse or mule to and from the manure banks, to the more active labour of raising and breaking limestone rock, even though it should be on his own farm. Potatoes and oats (without any regard to alternations), are the general crops in this district. In the neighbourhood of Steagoe Fort (a curious remnant of antiquity) the land is well suited to sheep; and towards the western limit of this barony the soil improves, and tillage consequently increases, sea manure being available. The great range of almost inaccessible mountains

called Macgillicuddy's Reeks, in a northern direction, afford pasturage to a great number of diminutive black cattle and sheep. Lime is used in the northern parts of the barony for potatoes. This is spread on the lea, and then a ridge and furrow are marked out with the spade: dung (heath which has littered the cattle being the matériel) is then spread on the ridge, the potato set is then laid, and covered by inverted sods from the furrow; the loose earth beneath the abstracted sod is subsequently shovelled over the potato shoots when they appear above ground. Major Mahony, the proprietor of the romantic castle of Dunlo, shewed his neighbours the more approved method of taking a crop of oats in the first instance.

"The second year the brows of the ridge are levelled in, and one spit being dug across the ridge, beginning at either end, the potato-sets are laid in this newly formed trench, and are covered by digging, and throwing forward the next line or space in the same manner as that of digging in dung in a garden bed; in some instances dung is in the second year applied on the surface, and dug in, as above, upon the sets. But a very general practice, particularly in reclaiming peat-bogs, is that of re-digging, without any renewal of seed, except what has been left in the ground from the preceding year, which practice shall be fully stated in speaking of the bog-improvement, where it is particularly applied." *

Red flow bog is or used to be treated through four successive crops in the following manner by Mr Bland of Derryquin. The mode is so peculiar that we shall give it at length in the words of the report already referred to:

"First Crop of Potatoes on Red Bog.—The intended ridge being marked by a line, the furrow is scored across by the spade, and the surface sods of the furrow being raised by an implement, called a graffau, are tossed up on the same space, to receive the air. Upon the ridge, sea-weed is spread, at the rate of 12 tons per acre, some weeks before the time of planting; on this manure the potato sets are laid, and are covered first by the inverted sods from the furrow, cut a little by the spade in laying them on, and, finally, upon the same day, by the raw peat or bog stuff dug from the furrow; when this last covering has dried a little, the labourer goes over the ridge striking the edges of it with the back of the spade, and chopping the opening clods of turf or peat upon the surface of the ridge, which, by these means, and by the tramping of the labourer, becomes close, compact and smooth; resembling at a distance a ridge, finished by the last shovelling of a fine loam; this is called Hacking, by some Packing, and closes the operations for the first crop.

* Report of the Agriculture, and Live-Stock of the county of Kerry, prepared under the directions of the late Farming Society of Ireland.

"The *second* crop of potatoes upon red bog is had by what is called Re-digging, in which a peculiar sleight and dexterity is practised. Without any alteration of the furrows, the manure (sea-weed) is spread upon the ridge, and the seed, or a portion of small potatoes, having been left the preceding year in the ground, the labourer, standing on the bed or ridge, and beginning at one end, makes a transverse cut or trench, and from an adjoining space, of about fourteen inches broad of the upper surface, thrown into that cut or trench, he picks with the corner of his loy the seed-potatoes which have lain there from the preceding year; and, with the same implement, arranges them at proper distances, from six to eight inches interval, across the bed, upon the upper part of the surface soil thus thrown forward; over this he places a proportionate quantity of the manure or weed, drawn forward from the surface of the bed, upon which he throws the remainder of the tilled surface of fourteen inches space, scraping it clean off, till the original surface-sod be exposed; this sod, not sufficiently rotted in the one year, he most dexterously scoops off with his loy, inverting it upon the top, settling regularly, and striking it well, so as to close the joints and produce a smooth and even surface. The same process is observed upon every space of fourteen inches, till each ridge be finished. Before the plants rise, any mould that may have fallen from the sides of the ridges in the course of the year is shovelled up, to remedy inaccuracies, and to fill any gapings of the soil that may appear; and thus are terminated the operations of the second year.

"For the *third* crop of potatoes on red bog the seed is not suffered to lie from the former year, as the furrow is to be changed. The space for the new furrow is marked out in the heart of the ridge, with equal spaces on each side of it, the old furrow thus becoming the centre of the new ridge, is filled up from the surface-soil of the spaces on each side, which lie within the newly marked furrows; those three stripes, viz. the old furrow, the space between it, and the new furrow, when levelled, constitute the new ridge. Upon this the manure is spread, and upon that the potato-sets are placed, and all are covered from the newly marked furrows, which were the centres of the ridge of the former year. This completes the process of the third crop.

"For the *fourth* crop of potatoes on red bog, the seed is left in the ground the preceding year, and the crop is taken by manuring and re-digging, as in the second year, with less trouble however, in consequence of the original surface-sod being by this time perfectly decayed and blended with the soil; which by these four annual operations (having yielded an indifferent crop the first year, a moderate one the second, and an abundant return for the two last) is rendered capable of yielding a plentiful crop of oats, and if then laid down to meadow, and carefully freed from the surface-water, may be preserved in a productive and profitable state. Of the value of this species of improvement, Mr Bland is well aware, and not only adopts it himself, but encourages his tenantry to it, and has the most part of his labourers' potatoes produced in this way, by giving them the bog for the four years gratis. The sea-weed seems to have a rapid effect in causing the vegetable matter of which these bogs are composed to ferment and putrify; and this good effect is so perceivable, that even the common people prefer this manure to any other."

In a climate where frost so rarely prevails, if the soil be preserved from stagnant water, the practice of thus keeping the seed in the ground has its advantages: the poor owner is secured from the temptation of consuming, in a hungry hour, the portion required for seed; and is more sure of sound seed by leaving it whole in the peat soil, than if it were dug out, thrown into a fermented heap, and cut into sets. The recent failures of the potato crop in Ireland, would lead us almost to approve of the poor Kerry-man's system, which critically coincides with some of the best theories for preserving seed.

In 1814, a great number of the higher grade of agriculturists was influenced by the late Dr Richardson in his enthusiastic admiration of fiorin culture, and became affected with his mania. We are pretty certain, however, that the formation of fiorin meadows, by scattering the stoloniferous strings, has been long abandoned. Fiorin (*Agrostis stolonifera*) is the indigenous grass of many hills and mountains in Ireland, and flourishes with peculiar power on the verge of a bog hole, where its succulence invites cattle to eat heartily of it. By keeping the surface of the land where it naturally prevails free from coarse herbage and intruding weeds, it can be rendered a very valuable food, and is highly serviceable for milch cows; but the Doctor unquestionably pushed his theories to absurd lengths, and has consequently drawn down upon them more reprehension than they really merited.

Mr Bland, a tenant of the Earl of Courtown, (but with a lease for ever), adopted a very good plan for the encouragement of bog improvements, by setting allotments from five to twenty acres, given free for a limited period, next charging half rent for seven years, and then finally letting them at a fixed and moderate rent. The tenants were under obligation to build small but comfortable houses, the landlord providing cottage windows, and lime for the chimneys and dashing. The effect of this encouragement was, that the tenant, in many instances, proposed to pay a fixed rent before the expiration of the *free* term, in order to secure a lease of twenty-one years and a life.

The same principle of encouragement is now being acted upon by Captain Kennedy, in the county of Tyrone, on a tract of improveable bog under his management. The details of his

practice are interesting, but being unconnected with the object of the present sketch, we cannot venture to insert them. Captain Kennedy has published a clever pamphlet, with the humorous title "Employ, Instruct, Don't hang them;" and to this we refer our readers for amusement and information.

The Barony of Iveragh.—This wild barony is a peninsula, bounded by Castlemaine and Kenmare bays; at its western extremity lie the Skelligs and Valentia islands, the former of which (the great Skellig) is a stupendous rock, surrounded by inaccessible precipices. This, since the days of St Patrick, has been the scene of superstitious observances, some of which involve no inconsiderable degree of personal danger to the devotees, from the terrific nature of the ascents through which they have to climb, in order to reach the hallowed spots where their devotional exercises are to be made. On the entrance into this barony, where Lough Currone discharges itself into the bay of Ballinskelligs, there has been some improvement made at Waterville by Mr Butler, who has reclaimed several acres of rocky surface at an expense of 300 men to the acre. Sea-weed and calcareous sand have been the great agents of fertilizing this wretched soil. The sand has been applied in large quantities to form a soil. This sea-sand is frequently borne ten miles into the interior, on the backs of horses, by the poor husbandman, who scatters it very sparingly, and yet derives a remunerating crop for his labour. Lime and calcareous sand, if abundantly used, would render productive all the shallow black bog which abounds here. Mr Butler crossed the native ewes with Southdown rams. Carts are now to be seen here, in consequence of the new road communication, where, twenty years, the back of a pony bore the sea-manure or potatoes (2 cwt. in each load), to the mountain cabin. The breed of black cattle is improving in this neighbourhood.

Between the island of Valentia, the property of the Knight of Kerry and the Main, is a safe and admirable harbour, with two entrances, and may yet become a packet station, if not a general mercantile depot, connecting British and American intercourse. It is recorded that, in the reign of Anne, it was often an asylum for French privateers, which could lie here securely, by keeping boats on the island to give notice to which end of the harbour

a British ship of war might be approaching. The privateer directed her course according to the signal, and escaped at one end as the cruiser entered the other. The island of Valentia is the most fertile part of the barony, and is capable of supporting a great number of black cattle and sheep. The late Farming Society of Ireland presented the proprietor, many years ago, with two Southdown rams, which have improved the native breed. Potatoes are cultivated principally on the bogs, and after successive crops of these have been taken, the reclaimed land, after a crop of oats, is allowed to run to natural grass—fiorin—which, if not poached by cattle in wet weather, yields abundantly. The soil of the island varies from peat to clayey loam, and is suited to every ordinary crop. The hilly parts form dry and productive sheep-walks. At Ballimabloun is a fine dry sheep-walk, with a well-enclosed grazing farm; and at Fermoyle the sides of a valley might be rendered admirable pasture land. Several good slated houses are on this island, which has latterly become an object of interest to British travellers. The northern extremity of Iveragh by Drung and Cahircanaway, is a range of desolate mountains, affording no subject of interest to the mere agriculturist; yet these elevated regions, as well as all the mountains of Kerry, are objects of delightful research to the scientific botanist, who here finds a great variety of rare indigenous plants.

The baronies of *Magunihy* and *Truaghnamy* are contiguous, and of a character different from those we have been noticing. A perceptible distinction in the quality of the cattle appears on the inch-lands on the line to Glanflesk. Mr Cronin of the Park is the proprietor of much of this alluvial land, which is set for dairies, the dairyman paying a stipulated sum for each cow. The number of calves reared is in the ratio of four to twelve cows. When Mr Radcliff visited the Park, Mr Cronin held in his own hands 1700 acres, and as he reclaimed portions he let them to tenants. From this gentleman's delightful residence (very near Killarney), amidst scenery of an exquisite character, and surrounded by picturesque cottages, to Mill-street, there is a long line of bog and mountain, easily improveable, but, like vast tracts of this county, *left to take care of itself*, as if draining and liming had never been heard of. A few exceptions of

local improvement occur, but they are "like angels' visits, few and far between." Yet, when turnip husbandry was little practised in any part of Ireland, and the improved system of agriculture rarely pursued in the remote provinces, some of the proprietors in the vicinity of Killarney afforded admirable examples of skill and enterprise. Lord Headley has long been a resident improver of *the first order*. The Earl of Kenmare and the late Mr Herbert (whose son will very soon become of age), have furnished valuable examples of improving husbandry, but much still remains to be done even in the neighbourhood of their own demesnes. We allude in particular to the neglect of draining, and the non-application of lime, even where limestone is on the spot. There are limestone quarries on the eastern limits of the county, between Killarney and Castle-island, belonging to Lord Kenmare. At these quarries there are many kilns, which supply a very extended district; and farther on, not far from Pobble O'Keefe, where there is a small portion of limestone. In the immediate vicinity of Killarney the verdure is remarkably fine, and though the soil is shallow it yields good crops; it is asserted that the low grounds about the town (being light) are inferior to the soil of the higher land, which, though abounding in stones, has a deeper stratum of loamy clay. Trenching this land would obviously be the best mode of treating it.

The park of the Earl of Kenmare contains 500 acres; a great deal of his Lordship's demesne is devoted to pleasure ground. The father of the present nobleman formed nurseries filled with forest trees, and all those varieties of shrubs which flourish so luxuriantly around the enchanting lakes. The number of trees growing spontaneously from seeds, self-sown, or scattered by birds or by the wind, in places where man has never placed one, is so numerous, as to have led the Scotch steward of the late lord to remark, that "here Nature has planted and the cattle pruned, while man did nothing." Lord Kenmare's woods in this county occupy 2000 acres, valued once at L. 100,000, and those of Mr Herbert extend over 4000 acres. Between the years 1827 and 1835, there have been planted on Mr Herbert's property 758,000 forest trees, and 16,700 shrubs in the demesne, which is one of the most exquisite beauty: allowing 8000 trees on an average to each acre, (a very liberal allowance), 94 acres

have been planted here within eight years, and the plantations are still extending. Lord Kenmare has four good nurseries, containing about a million of young trees, fit to be put out; and at present this valuable resident nobleman is planting large sized ornamental trees in his demesne. Mr Hartland's nursery at Killarney contains nine acres, well stocked with forest and fruit trees, and ornamental shrubs, (he has also another nursery of six acres at Tralee); and Mr Powell has a nursery of two acres. Lord Headley's plantations, in the wilds of Iveragh, are, we have been informed, on a *vast* scale. The observation of the Scotch steward would now but ill apply in the neighbourhood where it was made; yet with all the taste for planting which partially prevails, there are countless acres of this county which, though peculiarly suited to trees, are utterly waste. When the immediate neighbourhood of the lakes is lost sight of, frightful tracts of country, sheltered too from the south-west wind, present themselves without a symptom of plantation. Nor should the expense of converting unprofitable bogs and hills into woods, discourage their proprietors from planting, for this can be effected at very inconsiderable cost. We happen to know that, in Ireland, considerable skill and economy are now practised in the planter's department, and that our Highland system is being acted upon. In the county of Tyrone, Mr Murphy (rural improver) planted within the last year, for the Marquis of Abercorn, 300 acres of exposed ground; and, on an average of 500 acres, the cost, including fences, drains, and trees, (7000 2-year old transplanted trees to the acre), did not exceed L.2, 5s. per acre, or L.3, 10s. per acre if planted with 3-year old trees.* This is not a formidable outlay for any proprietor to undertake, and would be highly remunerative in many parts of the county now under consideration. It was at one time in the contemplation of Lord Headley to plant 6000 acres in the barony of Iveragh, and we have no reason for asserting that this stupendous undertaking will not be realized. This nobleman has several good cottages on his estate; his tenants hold farms from 50 to 200 acres in extent; they have liberal

* The Marquis of Abercorn intends, it is said, to plant *four or five thousand acres* on the irreclaimable parts of his estate in the county of Donegal, and we have little doubt that the intention will be realized.

allowances for the purchase of lime and permanent improvements. Some of these tenants have taken in (by a bank a mile in length), 1000 acres that had been overflowed by the sea at Ross Bay, a distance of twenty miles from Killarney, and reclaim a portion of those acres every year. From Killarney to the verge of this barony, in the direction of Castle-island, the land is not bad.

The Barony of Truaghnamy contains a large portion of bog, of which some is reclaimable. A road traverses the most improvable part, which has a regular fall and is of a greasy quality; other parts are of the red flow description. There is, however, a rich vein of land throughout the greater part of the barony. At Dicksgrove this good quality of soil commences, and here every variety of corn crop is grown: the clayey loam produces good wheat crops, and parts inclined; peat yields potatoes and oats abundantly; indeed the proprietor would be inexcusable, if his husbandry were defective, as he has in his neighbourhood abundance of lime sold on cheap terms. After an application of this manure, the low lands here become excellent meadows. We saw some very fine wheat last year in the neighbourhood of Castle-island, on large farms held under Mr Herbert, and specimens of husbandry (we believe on the farm of Mr Parnell) far superior to any which we had witnessed for many miles round, the fields being large, comparatively well shaped, and remarkably well enclosed, with a good house and offices. Lime is on the spot, and nothing is required but skill and attention, which here are remarkably evidenced; the ridges, in particular, struck us as having a proper breadth and formation. The unfavourable circumstance of a joint and undivided proprietorship of 600 acres around Castle-island, among half a dozen of the principal landowners of the county, has materially tended to injure the interests of this place. As soon as Mr Herbert shall have attained his majority, some important alterations will be made in the farm-management of his property in this neighbourhood, and certainly no part of the county is more suited to the operations of improved husbandry. The town itself is a miserable one, shewing the evil results of undivided property.

The cows here are large and of a good description, and dairies are numerous. The mode of dairy management in Kerry may not be uninteresting: we give it in the words of the reporter already referred to.

"Dairy farms are managed in different ways. In some cases, the proprietor, both of land and stock, sets a certain number of cows upon a given run or scope of ground, by the year, for a particular sum, engaging that all the cows shall have calved by the 21st of June, or, in failure of this, allowing a drawback of four pottles of milk per day (valued at one shilling) upon each cow, from the 21st of June to the day of her calving. In other cases, the land and cows are given up to the management of a dairyman, who is to have the privilege of two collops' grazing (usually taken by putting on eight sheep and a horse), he engaging to produce his employer $1\frac{1}{2}$ cwt. of butter of first quality, one guinea horn-money, as it is termed, for each cow, and for every twenty cows, a fat pig of 2 cwt., all extra gain to be his own. By horn-money, is meant an allowance for the sale or value of sour-milk.

"To every dairy-farm a certain portion of meadow-ground is annexed, for the winter provender, which the dairyman is obliged to supply at his own cost: should this supply fall short, the proprietor buys elsewhere, and the dairyman draws it home.

"This system is liable to many frauds, and much disappointment; for at the best, what avails the dairyman's engagement, if he fail in the quantum promised, or if he be not honest enough to content himself with whatever surplus there may be beyond the stipulated terms? He is in most instances a person without substance, and needy, with a large family, depending, perhaps, entirely on the dairy for their support. If he don't make as much butter as he engages to do, he can't produce it, and though he should, if he pleases to secrete a little, his want of solvency leaves the farmer without a remedy. With respect to the quality of the butter, also, disappointments may arise. In the Cork market, the qualities are distinguished into first, second, and third. The first is 4s. per cwt. higher than the second, and the second 6s. per cwt. higher than the third. The farmer naturally seeks to guard himself against the reduced prices (the inferiority of quality turning upon the negligence of the dairyman), and makes a provision in his agreement, that the difference between the third and first quality be made good in money, for which contingency he has but the same security. To this may be added the dishonest and disgraceful practices of this description of dairymen, who (as has been mentioned to the reporter) in order to make the cows continue their milk, have recourse to stratagems to interrupt foetation, and when a cow has failed in her quantity from too thrifty a tendency, have been known to force down the throat a stone rolled round with hair to sap the constitution, and prevent the putting on of flesh, which is always inimical to the profits of the dairyman, who has no interest in the animal beyond her milk.

"This species of dairy, from the foregoing reasons, is not so much in use as formerly, but is in some instances still resorted to from necessity; for in this county, where the population is not sufficient to cause a great competition

for farms out of lease, and where the general form of all leases comprises a clause of surrender, which if the take be unfavourable or unfortunate, is always acted upon, the proprietor is often obliged to stock the land himself with dairy cows, and to take his chance in the manner above stated; but most people endeavour to set, at a fair rent, to a substantial cowkeeper; or if they can find an honest and confidential servant to commit the dairy management to his care, at a certain wage, and receive the entire produce for their own account. This is the case in a dairy belonging to Mr Hussy, near Castle-island, which consists of thirty-six cows. The produce in the summer months is one barrel of cream in two days, which yields one firkin or full-bound of butter, of about 62 lb. weight. The season of dairy produce may be limited to eight months, the latter four yielding but half the quantity of the first four months, when the cows are fresh, and the pasture luxuriant: if calculated upon this principle, the return would be within a fraction of $4\frac{1}{2}$ cwt. per cow. In this dairy of thirty-six cows, 72 pecks or vessels, in which to set the milk, are necessary, each peck, being of cooper's work and circular, is five inches deep, and twenty in diameter. The milk is let stand in these for two or three days, as occasion may require. From May to September, the milk is set but two inches deep in the peck; from that time forward, about four inches, a greater body being necessary to throw up the cream, as the weather becomes cold. The upper surface or skin of the cream (which has the appearance of leather), is first taken off, then the coat which lies between that and the sour milk; these two skimmings go to the churn, and lie in a body for two days previous to being churned. The upper part of the sour milk is given to the servants, and the lower part to fourteen large pigs and three calves. The barrel churn is made use of, and in about an hour and a half produces the butter. It is a simple and effectual churn, worked by hand between two uprights, and delivers its contents ready to the cooler; in this large vessel, the butter is gathered, and when completed and packed, as soon as a load of twelve or fourteen firkins is made up, it is sent off to Cork, a distance of forty miles. This dairy of thirty-six cows is conducted and managed by one man, one woman, and two girls, in a shabby and apparently inconvenient house of mud walls, unplastered and without windows; the prevalent idea being, that either lime or glass would be injurious to the butter process. A dairyhouse, well constructed and neatly kept, would no doubt be more agreeable to the eye, but that it is not absolutely necessary, is obvious, from the high esteem in which the Kerry butter is held at the Cork market.

A very skilful dairywoman at Sallowglyn, under her own management, would insure upon the land in the neighbourhood of Listowel, 1 cwt. of butter from each cow. In the county of Limerick, upon very rich land, she has produced from each cow of thirty-two, three full-bounds of butter, or 1 cwt. 3 qrs. 2 lb., besides supplying the house. As this person has been in the habit of acting in extensive dairies, and remarkable for making good butter, her method may not be unacceptable. After milching, she lets the milk cool for half an hour, then strains it into pecks or keelers to the depth of half a finger or $2\frac{1}{2}$ inches. She lets this stand for very sweet butter forty-eight hours, but for quantity sake would give it three days or seventy-two hours,

taking care to churn within twenty-four hours from the time of skimming. She washes the butter in four distinct waters, throwing into the last a handful of salt, and occasionally finds it necessary to give it a fifth or sixth washing, in order to dispel the entire of the butter-milk; she then mixes well and blends by the back of the skimming-dish, four quarts of salt, with as much butter as will fill a full-bound or firkin, in which it is at length packed, weighing about 66 lb. nett, the full-bound itself being about 14 lb. After scalding the milk-vessels, she is particular in having them well cooled with pure water, that they may be free from any warmth at the time of putting in the milk, which would otherwise become sour; having remarked that if milk be poured into a warm vessel, a bubble will rise upon the surface, and if that be broken, whey will be found under it. This woman never re-salts her butter, and has always made it of the first quality. The butter of this county, to the amount of 100,000 firkins or full-bounds annually, finds a market in the city of Cork. To attain that of first quality, it must be sweet, well coloured, and without any fault. The second quality must at all events be sweet, but is not expected to be perfect in colour. The third may be high coloured and sweet. In all those it is made essential that there should be no mixtures of different kinds of butter; but in an inferior or fourth quality may be two or more kinds of butter, not any of them good; and even a fifth or last quality is produced, which is called old third, and is little better than grease. Each of these had a proportional value, affixed in regular gradation from that of the first quality, which, according to the price of the day, furnishes the standard."

Until the recent opening of communication through the mountain districts by level roads, butter was carried to Cork on the backs of horses in droves of perhaps twenty each, and many of the farmers were (and probably still are) in the habit of raising money prospectively from the Cork butter merchants on *joint promissory-notes*, for which advances, as may well be supposed, the sellers, on the delivery of the butter, were charged a very sufficient discount. It would be absurd to expect prime butter in the mountain districts, where a long time must often elapse before a single firkin can be filled, and where there is no attention to cleanliness,—milk and butter being kept in a confined bedroom, tainted with the effluvia of a whole family *piggied* together. The mountain cow yields so little milk that the churn used seldom contains above four quarts! Yet the cow is milked in the *retired districts* with many formalities, and the process of churning is also conducted with peculiar ceremonies. The tail is usually held up (for luck, it is said) by some idle individual of the family while the milkmaid performs her office; and when a churning is about to be commenced, a little holy water is

sprinkled on the lid of the churn and on every human being in the house ; three pieces of lighted turf are then put under the churn in the name of the Trinity ; and finally the tongs are put on the fire, where they remain untouched until the process is completed. On May eve mountain cows, even from a distance of twenty miles, are driven to the Pap mountain to drink from a certain well there, and those who cannot send their cattle to the lucky well, bring some of its sacred waters to the cows, and give three sups to each of them. There is an absurd and cruel custom, also, not confined either to the very lowest of the peasantry, often resorted to when a cow fails in her milk, that of blowing wind into her fundament from the mouth of an old crone. This may be depended upon as a fact. We knew that it occurred within two miles of Killarney within the last year. This operation is also performed to make an unruly and cross cow quiet. We may add upon this species of superstition, that it is usual to slit or cut off a bit of the ear of a calf on the Friday succeeding the day of its birth. The little mountain cows are usually housed in the kitchen of the poor owner at night. Four or five of them are frequently littered upon heath during the whole winter in the room in which the owner's family eat and sit during the day, and without changing the litter frequently ; instances are not rare of tethering one of these little animals (they are not larger than a small yearling calf of an improved breed) to the leg of the bedstead on which the human members of the household sleep ! The native breed of cattle in the county of Kerry has been greatly improved by a cross with the Herefordshire bulls ; at Mucrus there is one of these at present. Lord Kenmare has an Ayrshire bull, and by him also the Kerry breed is improving. Lord Headley's bull is of the Holderness breed.

The soil between Castle-island and Tralee is rich, abounding with limestone, and supporting many dairies, but with a good deal of tillage, especially on the palatine colony on Mr Blennerhasset's estate, where orchards and gardens are to be seen, rare appendages to the Kerry cabin. On the boundary of this settlement there is some exceedingly fine land, and well managed too, at Arabella. This demesne (then occupied by a Mr Blennerhasset, but subsequently by Mr Rowan) was visited by Arthur Young when on his tour through Ireland. This celebrated

tourist speaks in laudatory terms of the then proprietor's spirited improvement of a large extent of mountain, by the application of 100 barrels of lime per acre; at this time the value of the unreclaimed parts was only 1s. per acre, but after Mr Blennerhasset's enterprising industry, it became during the war prices, however, worth from 40s. to 50s. This example has not been much imitated by the great body of proprietors. Near Tralee, the assize town, in which there is *one* exceedingly neat little street built by the Denny family, and terminated by an admirably kept demesne, the walks of which are open to the public, the soil varies, but is principally rich loam upon limestone. Having had painful evidence of the wretchedness of the habitations of the cottiers and small holders in so many districts of this county, it was with no small degree of gratification that our eye rested upon the neat cottages which Sir Edward Denny, one of the best of the resident landlords in Kerry, has built near the Spa of Tralee, which is about two miles from that town. He has reclaimed about 100 acres of rough land at this place, by the use of sea sand, which is highly calcareous, and which is here used, as elsewhere, in preference to lime: it is said that, in calcareous quality, it here falls short of lime only by one-fourth.

Between Blennerville and Castlemain lies the extensive mountain of Slievernish, which is too wet for sheep, but of a good quality for trees. On descending the hill towards Castlemain, there is a fine view of the harbour of Castlemain, of the lakes, the Gap of Dunlo, and Macgillicuddy Reeks. On the estate of Mr Godfrey, at the base of the mountain, the cottages have a pleasing appearance, and (lime being distant but a short way) much improvement has taken place on the lands of different persons here. In this district a considerable embankment was made many years ago along the river Maine, extending for three miles to Scarvina Bridge through the estates of three or four proprietors, among whom Mr Justice Day evinced the greatest skill and energy in reclaiming and rendering highly fertile a tract of low marshy moor.

On the opposite side of the Maine at Ballingamboon, and thence on both sides to its junction with the Laune, the Maine is in general *embanked*, but much remains to be done in this way in a place where rich estuary mud banks are yet unreclaim-

ed. The report of Mr Nimmo to the Commissioners for improving the bogs of Ireland, states, that the haven of Castlemain could be rendered an excellent port, and that the value of free navigation in that place penetrating through a very fertile district would be inestimable.

There is a fine salmon fishery at Kilorgan, where a vein of limestone quarry near the town supplies manure for the district, which produces excellent crops of wheat, potatoes, and oats; cows may be purchased at the fair, which is held at Durglan in August, from L.1 to L.10 or upwards; the stunted breed which are sold for the former price are sent in droves every year from the Kerry mountains even to Dublin, resting at night on the roadside wherever a little herbage presents itself. As they proceed in their route their ranks become gradually thinned by repeated sales, and of course, on their arrival in Dublin, they are far from being the élite of the body. We have seen some of them offered for sale in Sackville Street, as they mournfully stood at the base of Nelson's pillar, (as if they were about to be offered in sacrifice to the manes of the departed hero), at L.1, 5s. a-head, and sometimes at a lower price. Yet these half-starved and diminutive animals, when turned upon good pasture, increase in size and weight surprisingly. After being well wintered, they thrive in the next season after their removal from their native mountains, and will fatten to a weight from 3 to 3½ cwt. Instances are known of bullocks (kept over a second year) in rich pasture having arrived at 5 cwt. of excellent beef. Some of the heifers are held over for milch cows, and are good at the pail; an improved breed is however in all cases more economical.

Great numbers of small horses are exhibited at this annual fair, but the genuine breed of the old Kerry pony (of Moorish origin) has been wofully degenerated by crossing with horses of a larger size, and of less compact forms. These highland horses are often in droves of ten or twenty, and without ever having been embarrassed by a halter until a purchaser finds it necessary to apply one in order to detach his new possession from the herd.

Barony of Corkaguiny.—A chain of mountains from Brandon to Tralee separates this barony into two divisions. The

residence of Lord Ventry (who possesses by far the greater part of it) is upon that part termed the *peninsula*, the inhabitants of which are more industrious than those in other districts, but still very defective in their habits.

"Lord Ventry's system is this: he sets to a *resident* tenantry in considerable farms, from 100 to 300 acres, at a fair but not a rack-rent, upon leases of three lives, or thirty-one years concurrent, and employs a resident agent acquainted with the people and the property, industrious, prosperous, active, and intelligent. The grazing tracts of undivided mountains annexed to the farms of this district, make a joint tenancy in most instances indispensable; but where the tenants themselves please to subdivide and make partition, they are permitted to do so. One peculiarity pervades his lordship's leases; in general, the value of land is considered to increase with the population, and one might suppose a dense population to be an object with an extensive landed proprietor; but the population of this district has of late years increased so much, as to induce his lordship to insert a clause, limiting each farm in proportion to its extent, to a certain number of houses; conceiving that otherwise, the numbers upon a farm might increase to the consumption of its entire produce, without leaving any residue for the rent. This clause, however injurious in many points of view, if literally acted upon, places in the hands of a discreet landlord, a useful check in cases of emergency, without prohibiting his sanction of an additional settlement upon farms advancing in improvement. Some village lawyers, however, have evaded the clause, and contrived legally to accommodate their increasing numbers, not by additional houses, but by an addition to each house, (which sometimes exhibits a front of 100 feet), sheltering three or four generations, a couple of looms, and in some instances, the milch cows of their party. Upon more than fifty farms, which came under the eye of the reporter, upon this peninsula, the agricultural system (if system it can be called) is for the most part the same, viz., potatoes in the lazybed, for two, or three, or more years; then part of the tillage, flax; the remainder corn, as long as a middling crop can be had, which terminates the process, the land being let out without the assistance of seeds, to restore itself to grass; a talent which the soil of this country possesses very remarkably. There are, however, some exceptions on farms where the proportions of arable is but small, it is kept in perpetual tillage, and the wet and unimproved (but in most cases highly improvable) part of the farm is consigned to grazing: this is the case in the farms of Ballinranhig near Smerwick Harbour, and in the farms of Ballyouteragh and Ballincolly, in the neighbourhood of Ferritur's Creek: in each of those farms an extensive field, perhaps ten acres, has been, time out of mind, given up to tillage, without rest or fallow. The soil, in general, is a loamy clay, with a strong clay substratum, and gravel bottom. The succession—1st, potatoes in the lazybed, with seaweed and sand, and a proportion of dung; 2d, On part of the potato-soil, flax: to the remainder, wheat; 3d, Oats, and then potatoes again, in the same manner. Upon these fields the crops in general are very fair, and, in some instances, luxuriant; in one farm where the soil is inclined to a sandy loam

they used the calcareous sand more sparingly, remarking that the ground was tired of it, in which case the sea-weed is more resorted to.

"What an incentive to industry, and to an extended tillage (as one would naturally suppose) must it not be to have, in their very farms upon this entire coast, inexhaustible magazines of manure for every farming purpose? Their dairying habits furnish a certain proportion of dung, which, however valuable, is unnecessary to them. Either of the manures supplied by the ocean, is adequate to the production of any crop that they require; on loamy soils they act jointly with the best effect, and on soils where one of them is found to be injurious, the other answers as a corrective; upon swampy and retentive clays, the sea-weed is considered to add to the tenacity of the soil which the sand is capable of rendering loose, mellow and productive; and in the instance above mentioned, where the application of sand has been too frequent upon a light soil, the sea-weed is found to assist in rendering it compact, and in preserving its fertility.

"These fields of perpetual tillage still yielding profitable crops are a striking instance of the value of sea-manure; of which (wonderful to be told), so little use is made; for, though the inhabitants of this barony are the most industrious in this way, yet, comparatively speaking, nothing is done even here; and in other baronies, the people, though satisfied of the efficacy of the calcareous sand, cannot be prevailed upon to take the trouble of putting it out.

"Though every bay and creek along the coasts supplies this valuable manure, it is not all of equal quality, and without any chemical experiment, the eye can guide even the common farmer to the choice of that which is what they term "the richest;" this means that which has most shell or calcareous matter, which varies from 15 to 90 per cent. The best in this district are, the lands of Ballyamine, Cloghers, and Beenbawn.*"

Lord Ventry's demesne fattens sheep brought from the Ballyteigue Mountains at three years old; if kept to five years old they sometimes weigh 30 lb. a-quarter, and on an average 20 lb. a-quarter. Much good arable land is to be seen in this peninsula, and along the harbours of Ventry and Dingle, particularly about the latter town. The mountains here are all suited to sheep. On Caherbosking cattle remain in fair condition during the winter and spring without fodder (but now much better would they be with it); and in the glens sheep and even cows are *fattened* every year. Much of the range of the Brandon Mountains,—bearing plantain, florin, the poas, and festucas,—might be rendered capable of supporting sheep in thousands. Draining and the introduction of turnip-husbandry would admit an incalculable increase of these profitable animals.

A curious natural production, which is called *Meagh-vone*

* Radcliff's Report of Kerry.

(fat turf), of a saponaceous quality, is occasionally found in this district in shallow bogs, at the depth of two or three feet, in a stratum of from eight to twelve inches in thickness, of a light brown colour with a mixture of whitish clay. This is carefully saved and separated by the turf-cutter from the other fuel, and reserved as a substitute for candles during the winter season. It is thrown, when dried, in small pieces successively on the top of the fire, where it yields a pure and brilliant light, sufficient for all the purposes of domestic industry, and is preferred to the bog-fir, though this is very easily obtained. It is pronounced to be decayed wood, full of oily or bituminous matter.

The town of Dingle is occupied by fishermen. The boats (from four to five tons burden), with a crew of from six to seven men each, are very numerous. From this place the principal part of the coarse linens of the barony is sent to Cork. Flax is, however, not much sown in any part of the county of Kerry, although it thrives there remarkably well. Some years ago 250 hhds. of imported flax-seed used to be sown in this county, but the introduction of cotton manufacture has greatly superseded the home manufacture of linens, a matter deeply to be deplored from its effects on the domestic habits of the female peasantry.

In alluding to the humbler part of the fair sex of the county of Kerry, we must briefly describe their dress, which consists chiefly of woollen manufacture: their gowns and petticoats are of wool, the gowns dyed brown, the petticoats black; their woollen cloaks are blue, and under these a scarlet or yellow shawl peeps out. The old women wear handkerchiefs tied round their heads; the young women prefer the smartness which a cap (without a bonnet) gives to their appearance. The men almost invariably are clothed in blue or grey frieze coats (frequently with cotton velvet collars), corduroy unmentionables, and blue worsted stockings.

When the linen trade flourished in Dingle and Tralee, the shopkeeper bought the thread ready bleached from the country people, and employed weavers at $2\frac{1}{2}$ d. per yard of twenty inches breadth. A narrow linen called Bandlecloth, from twelve to thirteen inches in breadth, used also to be much more extensively made here before the general introduction of cotton manufactures.

The northern side of this barony is the most fertile, and its interests were materially promoted in 1759 by the energy of its noble proprietor, who opened a communication over the Connor Mountain (which overhangs the entrance to Letterlough); but cutting a zigzag road into the rock, forming fourteen distinct acclivities. By this traversing pass, the peasants, unawed by the terrific and dizzy nature of the road, convey provisions and manure on the backs of horses, which they often ride down the descent with the most perfect indifference to danger. 'This passage is one of the curiosities of the coast. Several properties in this division are interwoven with each other. At Teirbrin Mr Hickson resides. This gentleman is an improver.

The wheat country may be said to commence here. Castlegregory is the principal district for wheat, yet the soil here tends more to sandy than to clayey loam; but the sand is calcareous, and sea-weed, which is available, has the effect of correcting the looseness of the soil and giving it sufficient tenacity for wheat. 'The sea-weed is used here in a way unusual on other parts of the coast, being ploughed into the ground with the seed, instead of being laid on the surface. The Bonavounder sand in this neighbourhood is said to contain seventy-five per cent. of calcareous substance; it is sparingly used when carried to any considerable distance.

The two northern baronies of *Clanmorris* and *Iraghticonnor*, being each of comparatively small extent, and similar in their general circumstances, shall be taken into joint consideration. On entering the barony of Clanmorris near Odorney, the absence of limestone is plainly evidenced by the coarseness of the herbage and the retention of surface water; the soil is shallow clay, but at Lixnau, near the old mansion of the Earls of Kerry, limestone again appears, and the consequent change in the quality of the soil becomes distinctly marked. The drilling of potatoes is here frequent. Some remarkably fine Kacagay cyder used to be made here by Mr Hilliard, whose stock of dairy and other black cattle was seldom less than 400.

Listowel is a very neat town, considering the general character of the Kerry towns and villages. We had expected to find here every evidence of an absentee landlord, but happily found both in the town itself (the suburbs however are wretched in the

extreme) and in the whole neighbourhood, a reality of improvement for which we were totally unprepared. Listowel, from its peculiar localities, might be rendered one of the most interesting spots in this district. Lord Listowel probably gives encouraging leases, which alone would account for the appearance of his property at this place. Ballinruddery, the seat of the Knight of Kerry, possesses much picturesque beauty; the soil of the demesne, which is of very considerable extent, is naturally swampy and cold, but skill and energy have effected a favourable alteration in its quality. The Knight of Kerry was one of the first persons to introduce the Scotch plough into his county, and to exhibit good practice among his agricultural tenantry. Between Listowel (where the limestone stratum nearly ceases) and Ballylongford, the soil greatly deteriorates. This place is a little port for lighters conveying turf and potatoes by the Shannon to Limerick. The trade in turfcutting here gives considerable occupation in summer, but, judging from their squalid and listless appearance, we fear that, during nine months of the twelve, the inhabitants of this truly Irish village are unemployed in any remunerating labour. The cabins are filthy and tottering, dung-hills and putrid duckpools are at every door, and decency and comfort have no existence here. With peat soil (of little value here) around their houses, no garden is to be seen, nor any symptom of civilization. The road through the village is repaired with limestone, and yet none of this superabundant material is applied to the adjacent fields. Altogether Ballylongford presents an aspect of desolation and misery hardly conceivable by those who have not seen the reality. This place is on part of the property of the University of Dublin, but perhaps held by a twenty-one years' lease by some middleman; if so, we see no immediate prospect of an amelioration in the condition of the Ballylongford subtenants. The very nature of the tenure is adverse to substantial improvement; each individual Senior Fellow of the corporate body has but a transient interest in the advancement of the local interests of the property belonging to it. The highest bidder obtains a lease of the lands, and if he pays the stipulated fines and rents to the college bursar, no inquiry is made as to the actual condition of the under tenantry. On the expiration of any lease which may now be in existence, both

humanity and sound policy must suggest to the Board of Senior Fellows, "the expediency of bettering the condition of the present occupiers of the village and its adjacent lands;" first by sending the present unimproving middleman (we assume that there is one) to the right about, and selling to the immediate occupiers, *if of good characters*, their respective holdings, to be kept in order, and properly cultivated under the guidance of a skilful practical steward, whose duty it should be to watch over and direct all the details of rural husbandry. A corporation of wise and good men, such as that of the Irish University, should feel it an incumbent duty, under the existing circumstances of the Irish peasantry, to supply from their ample funds the means of that *minute personal superintendence* over their tenantry which can alone effect the desired change in their present condition. It is fair, however, to remind the reader that the Kerry peasants have a natural dislike to the exercise of industrious habits, beyond what are unavoidable for the preservation of life. A story is told of a person at Carrig Island, near Ballylongford, who, having been offered by his landlord a bonus on every hundred barrels of sea-sand *applied to his farm*, did put out an immense quantity, but where? upon the field next the beach, cunningly hoping that he would be rewarded for adhering to the letter of the promise, and overdosing one field instead of fertilizing four, from mere laziness.

Tarbert, which is a small village near one of the noblest parts of the ocean, has great capabilities of improvement. There is a good deal of old timber within a short distance of it, near the river's edge, on a retired bay, and altogether the scenery here is of most interesting character. The neighbouring turf bogs (happily unseen from the banks of the river) afford much employment to the poor, who have been stimulated to extraordinary efforts in the cutting and sowing of this fuel by the Rev. Mr Fitzgerald, a philanthropical and active clergyman of the Established Church, who lately provided for the poor around him means of increasing their turfcutting labours to a great extent, by opening a brisk market for the sale of it in the city of Limerick.

The habit of drilling potatoes, first introduced by the Palatines scattered through the country, prevails here. The farmers

have been in the habit, however, of making their drills too narrow—fourteen inches asunder—and placing the sets only six inches apart. As may be well supposed from such treatment, the potatoes produced are small; latterly the distances have been increased, and eighty barrels (twenty stones each) per acre, may be considered the average crop. The sowing of spring wheat in the cold grounds of this district has been usual. We are assured here that experienced women have the art of distinguishing, by the appearance of the eyes, the potatoes which will grow; they reject the *blind* seed, and never have a failure in the growth. With the exception of the parish of Kilmartin, the barony of Iraghticonnor is wet and spewy, inclined to rushes. The succession of crops among the peasantry is as follows:—1. Potatoes with manure; 2. Potatoes without manure; 3. Oats; 4. Oats.

At Ballykeigue, the demesne of the late Colonel Crosbie, a considerable proprietor, much experimental agriculture has been exhibited. From Ballykeigue to Kerryhead, there is much dry mountain for black cattle and considerable flocks of sheep, which, through Colonel Crosbie's, have been improved by judicious crossing with South Downs.

Towards Ardfert, from Ballykeigue, the low grounds are subject to inundation. The demesne of Ardfert Abbey, now the property of Mr Crosbie, a minor, and a relative of Lord Glandore, the former possessor of it, is singularly beautiful. It has been for some time under the management of Mrs Crosbie, who employs a Scotch steward, and exhibits good farming. The abbey ruins are among the objects which attract the tourist to this part of the country. This abbey was originally founded in the sixth century by St Branden, whose figure is boldly sculptured in the old church. These ruins are splendid, and are highly venerated by the people.

One word on the present superstitions of the Kerry peasant, especially about Killarney, and we dismiss our readers from a tedious and heavy article. In addition to what has been already stated under the head of dairy management, the mountaineers about Killarney will not shear sheep, nor wind *flannel* thread, nor pay debts to each other, nor remove from their place, on *Monday*, but on this day they will make shop purchases; they

will not wind *linen* thread, nor shear, on Friday ; the first person entering a house where the winding of yarn is in process, must wind a little for luck. On the morning of the 1st of May they will not allow fire out of their houses—no, not as much as would light a pipe. Vows are sometimes made by the friends of sick people to visit Wether's Well (within four miles of Tralee), and make three rounds of it on a Saturday if the sick recover ; or they undertake to go to a small lake (Loughkeenlane), and take rounds ; here they watch the motion of certain tussocks growing near its margin, which if they move (from the agitation of the wind) indicate the recovery of the sick person. Children, if dipped in a certain well at Killarney on the 25th of March (Lady-day), are secured from disease for twelve months. If a child is to be kept out late at night, the mother will fasten a bit of turf which has been burning to the frock of her darling, lest it should receive a fairy stroke, or any accident ; and should the man of the house be detained on a journey, the inmates at home preserve the water in which they have washed their feet until his return. Some of our own Highland superstitions have their analogies in the county of Kerry. Happily, though absurd in the extreme, these are perfectly harmless. D.

THE PROCESS OF RUMINATION OR CHEWING THE CUD IN
CATTLE, EXPLAINED UPON THE EXPERIMENTS OF M. FLOURENS.

IF a farmer were to maintain literally the vulgar opinion that the sun rises from behind the eastern mountains, and sets in the western sea, it might not lead *him* into any practical inconvenience ; but unless this opinion had been corrected by astronomers our ships could never have been steered, except at random, through the trackless ocean—though the establishment of the fact of the sun being in some degree at rest, while the earth turns round somewhat like a grass-roller, was not, upon its discovery, anticipated to be of so great practical importance as it has proved to navigation. In the same way may the correction of other popular errors lead to unexpected results of interest and value ; while, independent of this, it can never be unimportant to

establish truth on a sure basis. It is on this general principle that it is here proposed to correct the mistaken notions which have hitherto prevailed respecting the process of rumination or chewing the cud in cows, sheep, goats, and deer.

In proportion as knowledge is better than ignorance, it must be important for the farmer to have a correct notion of the process of digestion in his live-stock, inasmuch as it may render him better able to bring them into and keep them in good condition, as well as to prevent disorders, and to cure them when they occur. Accordingly, when we consider the singular modifying influence of chewing the cud in the process of digestion, and still more the influence of digestion itself on health and disease, we must admit that the examination of the process is highly interesting, though it is not a little strange that the inquiries of the most celebrated physiologists have often led to doubtful and contradictory results, a fact which can only be accounted for from the complication of the process, and the difficulty of tracing its several steps.

M. Daubenton, the distinguished coadjutor of Buffon, says, that "it has been in vain attempted to explain the mechanism of this singular operation ;"* and John Hunter, the greatest physiologist of modern times, expressly says, "In those animals whose stomach consists of several cavities, the precise place where digestion is carried on has not been ascertained."†

M. Bourgelat, also, an eminent modern French writer, says of the authors who have preceded him upon rumination, that "they appear to have been afraid to grapple with the difficulties connected with the discovery of the mechanism, . . . and that the rapid glance which they have thrown at the object seems a tacit confession of its being to them inaccessible." Yet M. Bourgelat himself has made little or no progress in the discovery, and tells us that "he only proposes his ideas upon it as doubts or as simple conjectures."‡

Dr Bostock, in 1828, speaking of the organs of digestion in ruminating animals, says, "there is some doubt as to the effect which is produced by the different parts of this complicated ap-

* Mem. Acad. des Sciences for 1768.

† Observations on the Animal Economy. p. 212.

‡ Elemens de l'Art Veterin, t. ii.

paratus, and as to the use which they serve in the economy of the animal.”*

M. Flourens, again, writing so late as September 1832, says, that up to the present day there has been nothing better than doubt and conjecture respecting the mechanism of rumination; and it was this which incited him to make the very satisfactory, though it must be confessed, very cruel experiments, that appear to clear up the whole mystery. Previous, however, to detailing these important experiments, it may not be uninteresting to take a brief retrospect of the statements of the older writers, and of the structure of the organs.

Aristotle and Galen, under the notion that rumination was peculiar to horned animals, were somewhat puzzled to account for the camel and dromedary ruminating; and St Jerome was curious enough, when commenting on the Levitic law prohibiting camel's flesh, to ascertain the fact, “I went out,” he says, “in the evening, and saw camels roll the food previously swallowed in their mouths, and bring up again what had passed for nourishment.”† Without going more minutely into the subject, they all seem to agree in the notion that rumination is indispensable, in consequence of hard or prickly herbage being used as food; yet it is not a little singular that such writers as Galen,‡ Albertus Magnus,§ and Aldrovand, should not have adverted to the well-known instance of the ass, which feeds on prickly and woody plants without ruminating. One plain fact will easily overturn the most ingenious theory.

There is some doubt respecting the derivation of the word rumination, some, with Isidore,|| referring it to a bulging in the throat termed *rumen*, and others, with Nonnius Marcellus,¶ applying the term *rumen* to the paunch, or first stomach; but whatever may be the origin of the term, the process, so far as it can be externally observed, consists, as St Jerome describes in the camel, in bringing up into the mouth the food previously swallowed, remasticating it, and again swallowing it. The interior mechanism by which this process is performed can only be in-

* Element. Syst. of Physiology, 2d ed. ii. 451.

† Apud Aldrovand de Quadr. Bls. 905.

‡ Admin. Anat. vi. 3.

§ De Animal. lib. iiii.

|| Isid. Hispalensis, Original. xii. l.

¶ Apud Aldrov. ut supra.

vestigated and understood by an examination of the organs. Except in rare individual instances, as in man, and in the kangaroo, the process of rumination is connected with a complicated stomach, very different from the simple stomachs of carnivorous or frugivorous animals, for instead of one cavity, there are at least four communicating cavities or chambers, each having a peculiar structure, and no doubt a corresponding peculiarity of function.

In the cow, the sheep, and other ruminating animals, the first cavity or chamber of the four-parted stomach, termed the paunch or maw (*Ingluvies*), is by far the largest of the four, is somewhat divided by ridges into several compartments or paunches, and is lined with a rough membrane, studded with small flat projections, two circumstances very important to be recollected. It is situated towards the left side, and serves by its heat and somewhat scanty moisture to prepare the herbage for farther change. It is inferred to have a rotatory motion, from the rounded masses of hair called bezoar stones, frequently found in it, arising from the conglutinated hairs licked off from time to time by the animal when cleaning itself, and said, without proof, to be miraculously medicinal. It is of a very extensible texture, and is frequently much stretched by over gorging it with food, its capaciousness, indeed, appearing to depend in some measure on the sort of food which is given to the animal. M. Daubenton says, that in a calf which has never eaten grass, though not very young, the paunch is proportionably much less than in the full grown ox, and infers that its usual great size is caused by the great mass of herbage daily devoured, and the fermentation which this always more or less undergoes. To prove this view of the matter, he tried the following experiment. —He fed two lambs of equal ages, and weaned at the same time, the one with bread, and the other with grass. At the end of twelve months, he killed them, and found that the paunch of the one fed with bread was very remarkably smaller than that of the other. Connected with the extensible structure of the paunch is its comparative want of sensibility, in consequence of which the animals go on eating without being satiated, till it is frequently over crammed, as graminivorous birds will likewise do, from their crop or craw being very similar to the paunch of

ruminating animals. Now, it is obvious, that when the paunch has thus been over crammed with succulent herbage, such as green clover, it will speedily ferment, in consequence of being subjected to animal heat, and excluded from the air, producing an extrication of more gas than can escape by the gullet. In such circumstances the animal is said to be blown or hoven, and fatal consequences may and do often ensue, from the gas increasing till the sides of the paunch are burst through, and its contents discharged among the intestines. But even when this does not take place, the distention caused by the gas impedes or suspends the process of digestion, by preventing rumination, which, as will presently be made appear, it must do.

The second cavity or chamber, termed the king's-hood or bonnet (*reticulum*), is situated on the right side, on the same level with the paunch, but hung upon it as a side pouch, or parallel sheath. It is very much smaller than the paunch, is lined with a rough wrinkled membrane continuous with that which lines the paunch, and the whole inner surface presents a net-like appearance, from a sort of ridged projections in polygonal meshes, or shallow cells, similar to a honeycomb. The functions of this cavity have given rise to the most contradictory opinions among the best physiological writers, as we shall afterwards see.

The third cavity or chamber, termed the maniplies (*omasum*), is the smallest of the four, and of a more complicated structure. The English name of maniplies, has been given from this structure, the inner surface rising up in many folds, one above the other, amounting from about forty in the sheep to about a hundred in the ox, forming about half those numbers of partitions, and all covered with a continuation of the rough membrane that lines the two first cavities. Some of these folds project farther than others, there being first two long ones on each side, within these two shorter, then two longer, and so on throughout the chamber. The smallest of these folds, lying between the opening from the second chamber or king's-hood, are puckered so as to act as a valve between the third chamber and the fourth.

The fourth and last cavity or chamber termed the red of the bag (*abomasum*), and by some the digestive stomach, is

of a larger size than the third, but less than the first, being about two feet and a half long in the ox, is of an irregular conical form, and communicates at its base or broadest part with the third by means of a valvular orifice, rendering regurgitation or vomiting impossible. The inner surface is furnished with a number of simple wrinkles or irregular folds, more or less extended, eighteen in number in the ox, beginning at the upper and disappearing before they reach the lower end. This is also studded with projections, which take a rather serpentine or winding direction. The rough membrane which lines the three first cavities does not extend into the fourth, which is lined with a soft mucous membrane, similar to that of the human stomach, and having the property of curdling milk, hence the fourth stomach of the calf is used.

So much for the four chambers or four stomachs as they are sometimes considered ; but we would ill understand the process of rumination, were we not to examine minutely the manner in which they communicate with the gullet, or with each other.

The meat pipe or gullet (*œsophagus*), is an extensile membranous tube, much more complicated in ruminating quadrupeds than in man, the muscles which surround it being strong, and consisting of two rows of muscular fibres, crossing each other, and running spirally in opposite directions. The contractions of these muscles force the morsel of food begun to be swallowed onwards into the inlet (*cardia*) of the stomach so powerfully, that the process once commenced cannot be stopped, even by the will of the animal. The gullet enters the stomach of ruminating animals just where the three first chambers approach each other, discharging itself, as M. Flourens remarks, almost equally into the two first chambers.

We request particular attention to another part of those digestive organs which, being indispensable to rumination, may be termed the cud-duct (*ductus ruminans*). This is sometimes a groove and sometimes a tube, according to its action, and runs from the termination of the gullet to the third chamber, with the first chamber on the left, and the second chamber on the right of it, discharging itself, according to M. Flourens, almost equally into the second and third chambers. This cud-duct thick prominent margins, which can, as remarked by Blu

bach, be brought to meet so as to form a complete canal, and thus constitute a continuation of the gullet across the second into the third stomach. It was ascertained, as we shall afterwards see, by M. Flourens, that the cud-duct, contrary to the assertion of Blumenbach, remains always open, even when the gullet inlet (*cardia*) of the first chamber is closed. "All these parts," says M. Flourens, "the gullet, the cud-duct, the first, the second, and the third stomachs, not only communicate with each other, but they all communicate by a common point, the point where the gullet terminates, where the cud-duct commences, and towards which the three stomachs open or end."

Now, in whatever way we look at this anatomical structure and mechanism of the parts, we cannot determine many questions which arise as to their operations and functions. For example, as the ruminating animal chews its food and swallows it twice, it may be asked, into which of the three chambers it passes at the first or at the second swallowing, since that the gullet, either by its inlet (*cardia*), or through the cud-duct, communicates with each of the three? According to Duverney,* M. Perrault,† Blumenbach,‡ and Bostock,§ the food, when first swallowed, goes exclusively into the first chamber; while according to Daubenton,|| Camper,¶ and others, it goes equally into the first and the second chambers. According to Haller,** the food, when swallowed the second time, is returned into the first chamber; while according to Duverney, Chabert,†† and Toggia,‡‡ it goes into the second chamber; and according to Daubenton, Camper, Blumenbach, and Bostock, it goes exclusively into the third chamber. Again, it may be asked, from which of the chambers is the food first swallowed passed back to the mouth to be remasticated? Duverney, says from the first chamber; Daubenton, Blumenbach, and Bostock, say from the second chamber; and Perrault says from the cud-duct. These questions then, as well as the manner in which the first swallowed food is brought up into the mouth to be remasticated,

Euvres Anatom. ii. 434.

† Œuvres diverses, p. 436.

‡ Comp. Anat. § 90. 1.

§ Element. Syst. ii. 448.

|| Mem. de l'Acad. Roy. des Scien. 1768.

¶ Œuvres, iii. 42.

‡‡ Element. Physiol. vi.

†† Des Organes dans le Ruminans.

‡‡ Sur la Rumination.

were all doubtful and undetermined previous to the experimental investigations of M. Flourens, of which we shall now give a detailed account.

In order to determine the first question, as to the particular chamber or chambers into which the food is discharged when first swallowed previous to rumination, M. Flourens caused a sheep to eat a quantity of fresh lucern, and opened it immediately afterwards before it had time to ruminate. He found the greater portion of this herbage, easily recognisable by the leaves, almost unbroken in the paunch or first chamber, and also another smaller portion no less distinguishable by its equally entire leaves in the king's-hood, or second chamber. Neither the third nor fourth chambers contained any portion of the lucern. He repeated this experiment a great number of times with herbage of every description, and uniformly with the same result, of the greater portion of the non-ruminated food being found in the paunch, a smaller portion in the king's-hood, in both cases equally unchanged, and none at all in the third and fourth chambers. M. Daubenton, therefore, must have been deceived by some effects of a previous rumination, when he says, "I remarked in the ox, as the aliment (hay) was passing into that part which forms the second stomach, that it was reduced to a kind of green paste resembling boiled spinach." Blumenbach is equally mistaken in saying that the food goes out of the reservoir of the paunch in small portions into the second stomach.

It being necessary to determine whether the same results would follow with other species of food besides herbage, M. Flourens caused a sheep to eat oats, and opened it immediately before it had time to ruminate. He found the greater portion of the grain unbroken in the paunch, and a smaller portion in the king's-hood equally unbroken; while the third and fourth chambers did not contain a single grain. He repeated this experiment a great number of times with all sorts of corn, rye, barley, wheat, and the like, uniformly with the same result, the grain, like the herbage, going exclusively into the two first chambers at the first swallowing. Having thus ascertained that the kind of aliment does not alter its route, M. Flourens next tried what effect a difference of volume would produce, and with

this view caused three sheep to swallow pieces of carrot from half an inch to one inch in length, preventing the animals from chewing them by passing them back into the gullet through an iron tube. In one of the three sheep he found all the pieces of carrot in the paunch, and none in the king's-hood; while in the two others, he found pieces of carrot in the king's-hood as well as in the paunch; but in none of them were any pieces of carrot in the third or fourth chambers.

It being thus proved that neither the sort of food nor its magnitude of volume, had any effect upon its route, it remained to ascertain whether the diminution of its volume or its being more or less fluid, would influence it in any way? With this view, a quantity of carrots were reduced by mastication to a thin pulp, and two sheep were made to swallow this, and immediately opened. In both, M. Flourens found the largest portion of the carrot pulp in the paunch and in the king's hood, but he also found in both a smaller portion in the third and in the fourth chambers. It appears, therefore, that unless aliment be reduced to a fluid or half fluid state, it does not, upon being first swallowed, pass beyond the king's-hood or second chamber.

As a general remark it is important to mention, that in all the preceding experiments, M. Flourens always found, both in the paunch and the king's-hood, together with the fresh swallowed and non-ruminated food, considerable quantities of other aliment, more or less bulky or dry, attenuated or fluid, and consequently affected by the process of previous digestion. He also found that there was almost uniformly a greater proportion of the bulky and dry digested aliment in the paunch, as there was almost uniformly a greater proportion of the fluid and attenuated aliment in the king's-hood.

So far the inquiry was easy, and the point to be ascertained simple, as it was only requisite to trace the food, little changed as it is by mastication, and consequently not difficult to be recognised; but the case is very greatly different in the instance of ruminated aliment and the second swallowing. At first, this aliment is more or less softened, and more or less macerated in its remaining in the two first chambers. It is also more or less divided, and more or less chewed by the second mastication, and it is much more difficult to recognise such altered ali-

ment, and consequently to trace it in its course through the several chambers.

It is obvious, therefore, that there are two modes of determining this question, one by means of some character which may certainly determine ruminated aliment in whatever character it may be found; or in default of such a character, another, by which it can be at once determined what aliment has just entered any of the chambers, and to follow this aliment into each of the chambers the moment it enters. Hitherto all authors seem to be agreed in the supposition that ruminated aliment carries with it a character distinguishing it from every sort of aliment, and hence the most simple and superficial experiments, all of the same kind, have appeared to be conclusive as to its course through the digestive organs. These experiments consist in making animals eat herbage, hay, and the like, opening them sometimes before and sometimes after rumination, and judging from the appearance of the aliment, ruminated or non-ruminated, found in each chamber, the part taken by each in the process of rumination. The results accordingly depend altogether on the supposed certainty of the characters distinguishing ruminated from non-ruminated aliment. If, however, we examine the points upon which these experimenters found this distinction, it appears that they consider all aliment which is coarse and bulky non-ruminated, and all which is reduced to a certain state of division or attenuation ruminated. From their going upon characteristics so very vague, it is not difficult to account for the discrepancies into which they have fallen.

Taking the instance of the first two chambers, it appears, from the preceding experiments of M. Flourens, that the paunch and the king's-hood almost always contain, together with the coarse and dry aliment, other aliments more or less attenuated or fluid, and according to the regimen of the animal it will be presently made appear that these two chambers may contain either dry and coarse or fluid and attenuated aliment. It will therefore be evident, that, according to the particular case observed by each author who follows these vague distinctions, each will form a conclusion contradictory to the others. The paunch, for instance, frequently contains, besides the dry and coarse aliments, other aliments reduced to a certain state of attenuation and divi-

sion; and Baron Haller, who particularly remarked these comminuted aliments, concluded that ruminated aliment, on being re-swallowed, was discharged into the paunch. The king's-hood likewise sometimes contains nothing but coarse aliment, and hence Daubenton and Camper, who had observed this, concluded that the king's-hood only contained non-ruminated aliments; but the king's-hood sometimes contains nothing but thin and fluid aliments; and hence Chabert and Toggia, who had remarked this, concluded that the king's-hood only contained ruminated aliments.

Now it is requisite, first of all, to consider that division or attenuation may not always be produced by rumination, since there are other forces in operation which may attenuate and divide the aliment. Such, for example, is the contractile force of the paunch, more particularly where it is crossed by the ridgy folds already described, and grains of oats introduced artificially at first, swell and become soft, so that their interior pulp is as fluid as milk; then they throw off their envelopes, and if these are gradually reduced to fragments or *debris*, without the assistance of rumination, that is, of a second mastication, the gullet, in M. Flourens' experiments having been previously tied, to prevent the possibility of such an occurrence. It is therefore obvious, from this alone, that when aliment is found in any of the chambers attenuated or divided, that it may not always have undergone the process of rumination; and hence the previous experiments of Daubenton, Haller, Chabert, Toggia, and others, are all faulty, from the authors not being aware of the attenuating action of the organs, independent of the process of rumination.

From the experiments above detailed it is proved that the food, on being first swallowed, goes into the two first chambers; but it is not proved that it goes immediately into both, and Daubenton and Camper suppose it to pass first into the paunch before going into the king's-hood. None of the experiments previously devised, how varied soever they might be, could solve this question, because, in all those experiments it was not immediately during the act of swallowing, but always a certain time after, and therefore subsequent to the possible passage of the aliment from one stomach to another, subsequent, in a word, to the death of the animal, that the experimenter can penetrate

to the two chambers to examine them. The impossibility of arriving at any certain conclusion on the old system, suggested to M. Flourens a new manner of experimenting, highly objectionable, however, on the score of cruelty

It is well known that animals, and even man himself, may survive for a greater or shorter period with artificial openings, either in the stomach or in the intestines, and hence M. Flourens conceived the idea of making such artificial openings in each of the four chambers, so as to be permitted to penetrate into the interior of each of the chambers whenever he chose, and in this way to ascertain the points in question by direct observation.

M. Flourens began by establishing a large artificial opening in the paunch of a sheep, that is to say, he first made an opening through the membranes of the paunch, and then drawing asunder the edges of the wound, fixed them by suture to the adjacent parts of the abdomen,—precautions indispensable for preventing the escape or the passage into the abdomen of the matter contained in the paunch, whether to bring nothing but the mucous surface of the chamber in contact with the exterior air, or to permit the experimenter to penetrate more easily and more certainly into the cavity.

When he had established the artificial openings in this manner, he waited till the animals began to eat. One ate the same day, and others two or three days after the operation, all not being at first equally affected by it, though some time later, when the primary effects have gone off, the general effects are in all cases nearly the same. Thus almost all the animals in which an artificial opening is established in any of the stomach chambers except the fourth, eat much more frequently than in their natural state, in consequence of a portion of the food escaping through the opening, and they also, for the same reason, drink a great deal more, but they ruminate less often, and become rapidly lean, seldom surviving many weeks, and often not more than a month.

When a sheep with an established artificial opening begins to eat, in a few seconds a part of the food which it swallows escape by the opening in proportion as it eats and swallows. Besides, upon introducing his finger, and directing it towards the gullet, M. Flourens felt the aliment enter into the paunch, at the instant

it was carried thither from the gullet. It is consequently certain that the aliment upon being swallowed the first time, passes directly into the paunch, but the experiments did not determine whether any food also passed into the king's-hood.

M. Flourens established an artificial opening in the king's-hood of another sheep, and when the animal began to eat he observed a portion of the food escape by the opening as it was swallowed, and on introducing his finger by the opening into the king's-hood, he felt it enter into it the instant it was carried thither from the gullet. It thence appears proved, that the aliment, upon being swallowed the first time, passes immediately into the king's-hood as well as into the paunch.

In another sheep M. Flourens established a double artificial opening, one in the paunch and a second in the king's-hood, and by alternately introducing his finger into each, he felt, as in the two preceding experiments, the food arrive in each of the two chambers. But besides, he observed, even when the animal was neither eating nor ruminating, that the abdomen slightly contracted; and when, during such contractions, he introduced his finger into the paunch, he felt that also contract, and at the same time he could likewise feel a portion of food carried from the paunch forwards into the king's-hood. It has been already stated that the paunch is towards the left, and the king's-hood towards the right side of the animal; and M. Flourens proved, that when any substance was introduced into the left artificial opening of the paunch, in a certain time afterwards it came out more or less altered by the right artificial opening in the king's-hood. It has also been already stated that the paunch is paved by membranous ridges into several partitions or pouches. Now, if any substance be put through an artificial opening into the pouch or partition farthest from the king's-hood, this substance will pass gradually and successively into the other partitions in the direction of the king's-hood, till it at length enters into it. It is consequently proved, not only that the food, on being first swallowed, goes immediately into the two first chambers, but also that this food can pass from the first into the second chambers directly, without being subjected to the process of rumination. In order to ascertain the peculiar action of the paunch and the king's-hood, M. Flourens introduced a variety of substan-

ces, and among others he sometimes introduced directly through the artificial openings small living animals, such as frogs, grey lizards, slugs, and earth-worms. In every instance these animals speedily died, and their texture was soon altered by the digestive powers of the stomach. Similar experiments made upon rabbits were uniformly followed by the same result, and consequently the popular opinion that small animals being swallowed and remaining alive in the human stomach and causing disorders must be considered untenable. The result of these experiments in explaining rumination will afterwards appear.

Although the establishment of artificial openings in the stomach causes animals to ruminate more seldom, it does not stop rumination, which often takes place in such circumstances several times a-day, and during the process M. Flourens introduced his finger frequently to ascertain what was going on within the chambers. Upon the food being swallowed the second time, he could feel some of it enter immediately from the gullet into the paunch, and also into the king's-hood, as occurred when it was swallowed the first time. But besides this, on separating the edges of the artificial opening, he could see a portion of the ruminated aliment go along the cud-duct into the third chamber or maniplies; and by means of an artificial opening in the fourth chamber, he was able to follow it thither. It appears certain, therefore, that a portion of the ruminated aliment is returned into the two first chambers, while another portion passes immediately by the cud-duct into the third chamber.

The preceding experiments relate only to solid food; but as authors have all stated the route of liquid aliment or drink to be different in ruminant animals, it became interesting, by the direct evidence obtainable through artificial openings, to ascertain the correctness of their statements. According to Camper, the greater part of any liquid swallowed is conveyed to the maniplies or third chamber, while a portion only remains in the paunch. "When animals," says Dr Bostock, following Sir E. Home, "that possess a ruminant stomach take in liquids, they are conveyed, in the first instance, into the second stomach, where they serve to macerate the food as it passes from the paunch, so as to prepare it for the process of rumination. *

* Element. Syst. of Physiology, ii. 462, 2d edit.

When an artificial opening is established in the stomach of any animal, it drinks much oftener than it does in the natural state ; and while it is drinking, water is seen issuing from the artificial opening, whether that may be in the first, the second, or the third chamber ; and if there be more than one artificial opening, one being in the third chamber, the water is seen issuing from this almost as soon as from the opening in the paunch. It is therefore proved that drink passes in part into the two first chambers as well as into the third and fourth, and that immediately in all the instances.

Reverting to the two facts, that coarse and bulky aliment passes exclusively into the two first chambers, and nothing but attenuated or fluid aliment into the two last, the causes appear to be easily explicable ; for as the two last chambers communicate with the first exclusively through the inlet into the maniplies, an inlet naturally narrow, as all writers have remarked, and which besides, as M. Flourens ascertained, in many living animals can become so completely contracted as to exclude every substance which is coarse or of a certain bulk.

It is not more difficult to explain why coarse and bulky food falls always directly into the two first chambers, while attenuated and fluid aliment passes immediately, in part at least, into the two last ; for upon opening the paunch and the king's-hood of a living sheep, as was done by M. Flourens, and making it swallow different sorts of aliment, when this aliment is coarse or of a certain bulk it falls partly into the paunch and partly into the king's-hood ; while, on the contrary, if the aliment swallowed be attenuated or liquid, it is seen passing immediately, at least in part, into the maniplies, and through the maniplies into the fourth chamber.

Upon examining what takes place in the gullet during the process of each swallowing, it is observed to be dilated by the aliment, and opening when the aliment is coarse, and then the morsel is carried through the gullet directly into the paunch or into the king's-hood. On the contrary, when the aliment swallowed is thin or fluid, the gullet remains closed, and in that case the aliment takes the only way open to it, which is through the oesophagus into the maniplies, and thence into the fourth chamber. To speak more precisely, it follows the groove by which

the cud-duct is prolonged into the gullet, forming in the corner of the latter a conduit always open even when the gullet is narrowed or quite shut ; consequently this groove of the cud-duct is very inaccurately described by Daubenton as opening and shutting almost like the corners of the human mouth, one corner remaining shut while the other corner is open, * whereas it is never shut. So surely, indeed, is the open or shut state of the gullet the cause of attenuated or fluid aliment, being carried along the cud-duct, that whenever even fluid aliment is too much accumulated, or is swallowed too quickly, or encloses a bubble of air, the gullet being dilated thereby opens, and the aliment falls into the two first chambers in the same way as coarser aliment.

There are then two distinct ways of swallowing the one by the gullet, the other by the cud-duct, and the aliment takes the one or the other of those ways according to its bulk and solidity, the open or shut state of the gullet determining into which chambers it can go. It is moreover the aliment itself which determines the opening or shutting of the gullet, as when coarse or bulky it opens the naturally shut gullet, and when attenuated or fluid it leaves the gullet shut and passes through the always open cud-duct.

Having thus ascertained the mode in which ruminating animals swallow their food, and the course it takes when swallowed, the next point of inquiry is the mode in which the aliment, after having been swallowed the first time, is returned into the mouth to be rechewed and swallowed the second time. The slightest observation is sufficient to shew that the swallowed aliment is not brought up again into the mouth by simple vomiting similar to that of non-ruminant animals, for ruminant animals have not only the common organs of vomiting, but peculiar organs whose mechanism and operation shall be presently investigated.

It is agreed among all authors that the organs in question of ruminant animals are of two orders,—mediate such as the midriff (*diaphragma*) and the muscles of the abdomen ; and immediate, such as the several chambers of the stomach ; but there is considerable diversity of opinion as to the particular chamber which influences the process. According to Duverney, the paunch is

* Apud Rozier, Cours d'Agriculture, iii. 694.

the principal organ of communication, in which opinion Bourgelat, Chabert, and Toggia concur, while Daubenton, who is followed by Camper and most English physiologists, contends that the king's-hood is the principal organ. It is obvious from the preceding experiments, that it must be one or both of the two first chambers which returns the food ; and in order to ascertain whether this was accomplished by their own or by some exterior force, M. Flourens made the following experiments.

Upon laying bare the four chambers of the stomach in a living sheep, M. Flourens was astonished at the small degree of re-ciliary and contractile energy in their tissue. He successively tried all sorts of irritation, by pricking, incision, the actual cautery upon the membranes of each of the four chambers in several sheep, but he could not in this way discover either any partial contractions in the fibres immediately irritated, nor any general vermicular motion, however feeble. On the contrary, when the chambers, particularly the king's-hood and the paunch, are in their natural position, that is, under the combined influence of the midriff and the abdominal muscles, their contractile motion is very distinct, a motion which can be well observed by means of an artificial opening either in the paunch or in the king's-hood, they are both found to contract with considerable force during the efforts made to bring up the food into the mouth.

The paunch has already been more than once mentioned to be divided into several pouches, by projecting membranous partitions corresponding with furrows on the outside of the organ. Now, on introducing the finger into the paunch through an artificial opening, the sides, and more particularly the membranous partitions, are felt forcibly contracting, and forming as it were knots. Again, upon raising up the superficial envelope of the middle region of the abdomen, and leaving untouched only the transparent membrane (*aponeurosis*) which covers the paunch, the exterior of this chamber is perceived contracting, dilating, and almost incessantly exhibiting a great vermicular motion. It is therefore certain that the contractile motion of these chambers of the stomach is much greater in their natural position than when they are laid bare.

In order to ascertain whether rumination would take place

without the aid of the abdominal muscles, which all authors maintain to concur in the process, M. Flourens deprived these muscles of their power of action in a sheep, by cutting their two nerves, (*nerfs diaphragmatiques*). The animal was immediately seized with a great wheezing, and the chest heaving with difficulty, breathing appeared to be carried on solely by the contractions of the deep-seated muscles of the belly. By degrees the wheezing diminished or disappeared; the animal began to eat, and next morning it ruminated but with difficulty, and with efforts affecting the abdominal muscles, which exhibited several successive contractions before the aliment could be brought up into the mouth. The cutting of these nerves, therefore, renders rumination more difficult without causing it to cease. It is to be recollected, however, that the cutting of these nerves does not stop the motions of the midriff, but only renders it more feeble. By other experiments M. Flourens proved, that when the action of the abdominal muscles is entirely stopt by dividing the spinal marrow, rumination ceases.

So much, then, for the organs which in ruminating as well as non-ruminating animals concur in ordinary vomiting; but the peculiar vomiting or bringing up the food into the mouth in the process of rumination is greatly different. The peculiarity in the case of rumination is, that the bringing up the food from the stomach is not a confused vomiting or belching as in non-ruminant animals, but a regular rejection of the aliment in detached portions. Daubenton, the first author that has given any distinct account of this peculiarity, which he says consists in the king's-hood contracting, detaching from the mass of aliment contained in it a portion thereof, forming this into a rounded pellet or *cud* (a corruption of the word "quid"), and moistening this to render its passage up to the mouth more easy. This account appears to be acquiesced in by Camper, by Blumenbach, and by most of our English writers. Dr Bostock says, "From the second stomach the food is again brought up into the mouth in the form of a rounded ball."* On the other hand, this account is circumstantially rejected by other authors of note. M. Chabert says there is small ground for believing those who pretend that the king's-hood is destined to round and moisten

* Element. Syst. of Physiology, il. 449, 2d edit.

pellets to be carried up into the mouth. M. Bourgelat again concludes, first, that the king's-hood does *not* detach from the mass of aliment contained in it the portion which is to be returned into the mouth ; secondly, that it does *not* perform the office of rounding and moistening such portions, as these naturally take the form given them by the gullet, through which they pass, and consequently he denies the existence of rounded pellets. It will immediately appear that both of these theories are erroneous.

M. Flourens began his experiments on the points in question, by cutting out a portion of the king's-hood in a living sheep, and in order to diminish, as much as possible, the contractile action of the remaining portion, he fixed, by several points of suture, the edges of this portion to the sides of the abdomen. Being thus deprived of one of its sides, while the other side was fixed so as to prevent almost any motion, it was evident the king's-hood could not contract itself into a rounded form, so as to prepare rounded pellets. Accordingly, therefore, if it be indispensable to rumination that pellets be formed, and if it be the king's-hood which forms these pellets, as Daubenton maintains, it would have been impossible for M. Flourens' sheep to ruminate ; but it did ruminate, and that frequently, and hence it is proved that the king's-hood does not perform the office attributed to it by Daubenton ; for admitting that pellets are formed, it is not the king's-hood that forms them. Daubenton, indeed, is the only author who mentions these pellets, and he had only seen them once by accident, for nothing of the kind is discoverable on opening the stomachs of ruminant animals. M. Flourens, finding that pellets, contrary to Bourgelat, were actually formed, resolved to trace them to their origin.

M. Flourens, in order to procure a pellet, opened, by an incision made lengthways, the gullet of a sheep, towards the upper third of its passage along the neck, hoping that if the animal ruminated, the pellets, as they came up from the stomach, on arriving at the opening of the gullet, would fall out. The animal, however, did not ruminate, and lost almost incessantly a prodigious quantity of saliva through the upper end of the incision. It frequently sought to eat, and more particularly to drink, but what it ate or drank immediately escaped through the upper incision. After preserving it for three or four days

in this state, he opened it, and found the paunch to contain no liquid whatever, all the materials in it being dry, and as it were kneaded into compact and separate masses in the several partitions of the chamber. What was more interesting, he found towards the spot where the paunch corresponds to the termination of the gullet, a pellet perfectly rounded, of about an inch in diameter, like the one seen by Daubenton. This pellet touched on one side the shut termination of the gullet, on another the mass of herbage contained in the anterior partition of the paunch, while the remaining portion of it was placed between the two margins of the cud-duct. With respect to the king's-hood, it contained nothing whatever, either solid or liquid.

In another sheep, M. Flourens made an incision in the gullet similar to the preceding. It ceased to ruminate, and lost, as in the preceding experiment, a prodigious quantity of saliva. After preserving it for two days, he opened it, and found the materials contained in the paunch already dry, but not so much so as in the first experiment. They were likewise divided into distinct compact masses, by the interior partition of the organ. The king's-hood was quite empty. With respect to the cud-duct, he found in it a pellet, not as in the first case completely formed, but beginning to be formed, and therefore shewing more distinctly the mechanism of its formation. The half-formed pellet corresponded on one side to the shut termination of the gullet, and on the other to the shut inlet to the maniplies, while the rest of its surface was placed between the edges of the cud-duct. It was apparent from this, that the apparatus by which it was formed consisted on the one part of the shut termination of the gullet approaching the shut inlet of the maniplies, and on the other the cud-duct.

The gullet of a third sheep was operated upon in the same way as the two first, and this animal, contrary to what took place in the others, continued to ruminate. It ruminated, indeed, some hours after the operation; and M. Flourens perceived the pellets which ascended along the throat fall through the opening of the gullet, as he had anticipated, when he contrived the first experiment. The pellets thus procured were moist and soft, but had not so perfect a round form as the firm dry pellet found in the first sheep. The pressure of the gullet

had rendered them somewhat oblong and cylindrical, though it was obvious they had been previously round. From the morning of the operation, the animal ceased to ruminate, and during three or four days which it was preserved, it ruminated no more. After this it was opened, when the paunch was found to contain nothing but dry materials moulded into distinct masses, and the king's-hood was completely empty, while the cud-duct contained a pellet dry and round, placed against the termination of the gullet, precisely as in the first sheep.

These experiments prove, that in the rejections of ruminating animals pellets are formed ; that these are rounded ; and that it is the cud-duct, together with the shut termination of the gullet approached to the shut inlet of the maniplies, which forms the pellets.

In order to form a distinct idea of the mechanism by which the pellets are moulded, it will be necessary to recollect, first, that the cud-duct extends from the termination of the gullet to the inlet of the maniplies ; secondly, that when it contracts, it approaches one or other of these apertures ; thirdly, that of these two apertures, the termination of the gullet is habitually shut, and the inlet of the maniplies naturally strait, can be so narrowed as almost to close by its own contraction ; and fourthly, that when the two first chambers, compressed by the abdominal muscles and the midriff, contract, they push in consequence the materials which they contain both against the two apertures opposite to each other, and against the cud-duct opposite to the two chambers. The two chambers, in this manner, in proportion as they contract, push the materials contained in them between the margins of the cud-duct, and the cud-duct also contracting, causes the two apertures of the gullet and of the maniplies to approach, while the two apertures being closed and brought near together, seize upon a portion of the aliment and detach it in the form of a pellet. The aperture of the gullet is closed during the act of detaching the pellet, because at that instant the midriff is contracted, and it only opens when the midriff is relaxed, and the aperture of the maniplies is closed, because at that instant the maniplies, as well as the other chambers, is contracted.

From these circumstances, it is obvious that the pellet must

be detached, as it could not otherwise be seized by the two approaching apertures; that the pellet must be round, for this is the form of the cavity formed by the parts of the organs employed in the process; and that the pellet must be about an inch in diameter, for the cud-duct, when contracted in the act of forming the pellet, is about an inch in length.

There results from these experiments of M. Flourens another important fact respecting the digestion of ruminant animals. Baron Cuvier long ago shewed that the salivary apparatus was unusually developed in such animals, and the experiments just detailed shew how copiously the saliva flows along the gullet into the stomach, and when it escaped by the incisions, that the food in the paunch became dry, hard, and compact, the chambers becoming deprived of all liquid. Even, indeed, when a pellet has been properly moulded, as without moisture it cannot ascend the gullet, it remains placed against the aperture of the gullet. In ordinary cases, no pellet is found on opening a ruminant animal after death, for the instant they are formed, they ascend the gullet into the mouth.

To secure, as far as possible, the moistening of the pellets in rumination, there is a remarkable provision in the structure of the kingshood or second chamber. When much contracted, Daubenton says its cavity is not more than an inch in diameter, and much altered in appearance. "I have seen," he says, "the interior of this organ without recognising it, as instead of a network of large meshes, there were only small sinuosities irregularly directed, upon examining which I found them to be deep, and containing fluid. While I was making these observations, the kingshood relaxed from its shrunken state, the sinuosities enlarged, and took, under my eye, the figure of the meshes of a net such as we have seen them in this organ, when it is not contracted. Then the fluid disappeared, but I squeezed the meshes to make them take their previous form, and at that instant I perceived fluid ooze out and even run. I repeated this compression, and the fluid reappeared each time: it was contained in the thickness of the organ as in a sponge."* M. Flourens adds, that when the kingshood contracts, the projecting membranes of the polygonal meshes are brought close together, and

* Rozier, Cours d'Agriculture, iii. 693.

form hollow cells or small tubes, transforming the whole interior into a sort of sponge, into the interstices of which the copious fluids usually contained in this chamber are squeezed at the instant of contraction, and not returned to the mouth for rumination along with the pellet.

It is apparently owing in part to this structure, that ruminating animals can subsist longer than non-ruminant animals without drinking. Goats and deer, for example, drink very little, and not to mention the camel and dromedary, whose stomachs are still more adapted to retain fluids. M. Daubenton proved by experiment that sheep could stand the want of water for a long time, and that they would live without drinking on chaff and hay. The French shepherds all agreed in telling him, that it was not necessary for sheep to drink every day, but they disagreed as to the number of days which could be passed with impunity without water. "After so many proofs," he concludes, "of different kinds, it cannot be doubted that a great deal of water taken as drink, with moist herbage, or other watery food, is injurious to the health of sheep and the cause of most of their disorders. The effects of this may be recognised in hydatids or vesicles full of water, which are so very common in sheep. These adhere to the viscera, and I have frequently found them in the middle of the brain, where they enlarge so much as to compress and reduce it to a small volume. I have seen them fill three-fourths of the cavity of the skull, and prove fatal after the animal had languished for a very long time. These hydatids sometimes pierce the skin and stick amongst the folds of the wool. In order to fill these vesicles, the fluid portion (*sérosité*) of the blood must be so abundant, and must escape from the bloodvessels so as to form deposits both within and without the body. Sweat is also a production of the fluid portion (*sérosité*) of the blood, and hence is more to be dreaded in ruminating animals than in others, inasmuch as sweating greatly diminishes the fluid, which ought to be employed in rumination. If sheep are sweating while they ruminate, therefore, there will be two evacuations of fluid at the same time, the body will be dried, and the blood exhausted and heated by the loss, while thirst will supervene so as to make them drink till they are overladen, and their temperament altered. Sweating is

also hurtful to sheep in other respects; for the fibres of their wool are thereby deprived of a part of their nourishment, which the sweat carries out of the body, while the heat which occasions the sweat causes the wool to grow too rapidly to acquire sufficient consistence. Yet we (in France) lodge our sheep in stables, where they sweat not only in summer but also in winter, and by ill-managed care and at an expense useless as well as hurtful, we affect their health and deteriorate their wool." *

It is obvious that on the same principles, the proper feeding of cows to produce the greatest quantity of milk must be regulated. If they are fed, accordingly, on very dry food, such as hay, the greater portion of fluids in the blood will be spent in the process of rumination and digestion, and the milk will be scanty; whereas, when the aliment abounds in liquid, such as mangold wurzel or brewer's grains, and distiller's wash as in Holland, they will ruminate much less, a less quantity of saliva will be wanted for chewing the cud, and a large proportion will go to the production of milk, though this will be thinner and not so rich in cream as the milk produced from drier food. It is to be questioned, indeed, by inference from the experiments of M. Flourens, whether cows fed wholly on distiller's wash would ruminate at all any more than calves, which so long as they suck never ruminate.

It thus appears, that a correct knowledge of the process of rumination, though a practical farmer might, at first sight, look upon it merely as a speculative curiosity, may lead to many important facts connected with the health and the diseases of sheep and cattle. Many other practical deductions and remarks might have been here added, but these would extend this paper much beyond our limits, and already more than enough has been stated to shew the interesting nature of the process of rumination.

* Rozier, *ut supra*.

THE AGRICULTURAL COMMITTEE.

Remarks on the Present State of Agriculture, in a Letter addressed to his Constituents, by CHARLES SHAW LEVEFRE, Esq. M.P., Chairman of the Select Committee appointed to inquire into the State of Agriculture. Session 1836.

THE dispersion of the Agricultural Committee without a Report, devolved on agriculturists, who naturally took a lively interest in the results of their labours, the onerous task of perusing three folio volumes of evidence. The omission of a report has inflicted a still greater evil on agriculturists, by preventing any practical measure of relief being founded on the evidence, and recommended by the Committee. Or the report might have only expressed the assurance of the Committee that the evidence suggested no particular mode of relief. In either of these circumstances, the agriculturists would have felt satisfied that their case had been thoroughly investigated. As matters stand, however, different minds will draw different conclusions from a perusal of the evidence; and the whole agricultural question may again have to be discussed and investigated at a future day. It is evident that agriculturists are disappointed at this result, which, had it been effected by more ingenuous means, would have secured at least their acquiescence, if not their approbation of it. But, in truth, little good was expected of the Committee, constituted as it was. It was evidently formed for a purpose other than providing a remedy for the complaints of agriculturists; but what that particular purpose was, was of course best known to those who circumscribed its topics of investigation, and composed it of a certain number of individuals, the number and quality of whom should not be altered. It was a carefully selected committee, and carefully selected by those who have long denied the existence of agricultural distress. A committee affecting to investigate *agricultural* matters should have been chiefly composed of members who were not only best acquainted with the state of agriculture and agricultural practice, but who had always and long shewn themselves to be the steady friends of agriculture. A few official persons such as the President of the Board of Trade, under whose special protection the

agricultural interest is absurdly placed, might have been added, with a few others unconnected with agriculture, to check partiality, if such were ever manifested. Such agricultural members would have best known how to elicit the complaints of the agricultural witnesses; and as those complaints were proposed to be thoroughly and finally investigated, the witnesses should have had full liberty to place their case in the strongest light. If they succeeded in proving their complaints well founded, then they had a just claim on the legislature for relief; but if they failed, the failure would have redounded to their own discomfiture. Had this plain course been pursued, we are confident that a report, either recommending some relief, or stating its inability to recommend any, would have been framed and presented in a shorter time than the Committee actually terminated their labours; for the same end might have been attained by fewer and more useful queries.

It must be admitted, however, that a question had been raised long before the appointment of the Committee, whether it was in the power of Parliament to grant any relief even were the agriculturists able to shew the greatest depth of their distress. In this portion of the island the opinion most prevailed, that Parliament could not alleviate the agricultural distress, because it arose, as was alleged, from circumstances, such as the low prices of corn, which were beyond the control of Parliament. It is true that the distress felt by the farmer in Scotland, was beyond the power of Parliament to alleviate, because the only relief that could possibly be obtained for it was in the power alone of the landlord to bestow, by reduction of rent. But the case of the English farmer is very different. He has not only to deal with his landlord for his rent, but he has tithe, county-rate, highway-rate, and poor-rate to pay—items of expenditure which, when taken together, increase the expenses of farming in England far above what they are in Scotland. Suppose that the Scottish farmer, besides having to settle his rent with the landlord, had also to settle a shifting stipend with the minister of the parish in which he holds a farm, to pay the county cess, rogue-money, and bridge-money, and had, moreover, to support the poor of the parish at the same variable rates that these imposts assume to the English farmer, would not he

complain in times when he found that industry did not find its own reward? He might, indeed, go to the landlord and crave a reduction of rent; but the landlord might reasonably answer, that the rent formed the smaller portion of his expenses. Reduce first your avoidable expenses, and then come to me for relief from rent. Such is the condition of the English farmer. To whom can he turn for relief in these circumstances but to Parliament, who alone has the power to equalize, on a just principle, the exaction of these heavy imposts? It is true that, were the English farmer entirely exempted from the payment of these imposts, he would probably have a higher rent to pay, as is the case in Scotland. But no one can better appreciate the advantages of exemption from payment of public burdens than the Scottish farmer; and when he enjoys the advantage of having only one party to deal with beyond the necessary trouble of managing his farm, he should, in charity, sympathize with his fellow farmers in England, and co-operate with them until they participate in his joy. A reduction of rent corresponding to the burden on land is not a full equivalent to the farmer for the payment of these burdens. He feels that they are misplaced on his shoulders. The land is not his, and he feels that *he* should not pay its burdens. Let the owner pay the burdens of his own land. It is not a sufficient excuse for the payment of those burdens by the farmer that he bargained for it, for no such bargain should have been imposed upon him. He could not avoid making the bargain, else he should not have obtained his farm. Besides, the bargain, such as it is, is aggravated to him and not to the landlord when the burdens assume their variable character. Should the county-rate, the highway-rate, or the poor-rate increase, it is the farmer and not the landlord who pays the increase as long as the period of the bargain entered into between them continues. Is there no hardship in this to the farmer? How can he foresee the period when, or the extent to which, an adventitious increase to the burdens of land shall occur? Would not every Scottish farmer feel it irksome to be placed under similar circumstances? Why then should the endeavours of the English farmer to place himself on similarantage ground with his Scottish brethren be discouraged? Will not his exertions be enervated to be told that Parliament

can do nothing for him? To rest in patience till times take a turn for the better? Why, the desire, the very object which the English farmer wishes to attain is, to be placed in similar circumstances with the Scottish farmer. Place him so as he shall have no other party to deal with than his landlord, and he will trouble Parliament no farther on his own account.

But, independently of affecting the condition of the farmer in England, there are considerations connected with the burdens on land which deserve inquiry. The tithe which supports the Church Establishment is a burden wholly on land. At the time tithe was instituted there was no other species of property available for that purpose; but, were its distribution to be made anew, there is no doubt that every species of property should share alike the burden of tithe. Every person may derive advantage from the National Church Establishment if he chooses; so every species of property, whether lands, houses, or moneys, should contribute to its support. Were such an arrangement made, there would be no want of funds to place the Gospel within the reach of every one. But as it is instituted, tithe, till very lately, had an evident tendency to check agricultural improvement in England. It should be commuted for a fixed money-burden on land, which the proprietor should pay and not the tenant. Under such a commutation, the farmer could improve his land to the highest pitch of fertility with the certainty of deriving the full benefit of the outlay of his capital. The county-rate imposes the whole expense on landed property of capturing, detaining, trying, and punishing rogues. As every member of the community is interested in the detection and punishment of criminals, the expense should be wholly paid by the nation. The highway-rate is a burden on land. This burden is imposed to maintain the highways and bridges throughout England. Now, as in the case of the county-rate, every member of the community, or at least every member of it who has occasion to travel, is interested in the state of the roads and bridges, it would be but fair that this burden should also be borne by the nation. It is true that travellers on turnpike roads pay toll, but the inadequacy of tolls hitherto to maintain roads may be estimated from the fact, that the roads in England are now covered with a debt of millions. It is indisputable that a

of road management, coupled with the very superior mode of road-making introduced and practised by M'Adam, would greatly reduce the cost of maintaining turnpike and cross roads. Three-fourths of the poor-rate is a burden on land. This is a rate which ought also to be a national burden. Its amount has been a positive infliction on agriculturists. That law is founded on humanity, which provides for the subsistence of every member of the community ; but the eleemosynary support of any one who is able to work and may find employment, is an infliction based on fraud and injustice. The new Poor-Law Bill professes to prevent this injustice, and to preserve the humanity of the old law. We believe the law originally passed in Elizabeth's time was as inimical to fraud as the new one. It was its local abuse, not its general inadequacy, that required amendment. The old poor-law was as rationally administered in Northumberland as the poor-law is in Scotland, and yet it was the same law which had been contorted into different shapes in various parts of the south of England. It is to be hoped that the administration of the new law will be rendered less oppressive to agriculturists, who will not in future be obliged to maintain labourers in idleness when their labour is not required. Whilst alluding to the new bill, we cannot refrain from strongly condemning the workhouse clause in it. It is attended with cruelty in its enactment, and it is unnecessary. It is proper that idle labourers should fare worse than the industrious who seek employment and find it ; but every one who receives relief, as well as the indigent, should be well maintained, and their existence not prolonged in misery because they are obliged to receive eleemosynary aid. But surely aid can be administered to them in their own dwellings as well as in a workhouse. Although they should be obliged to renounce, to the parish, all right of property which they may possess when they receive public charity, the charity could be entrusted to them in their own humble cot better than in a large expensive workhouse. Parochial charity is administered to the poor in Scotland in their own houses, and a poor man's own hearth is surely a more suitable place for meditation and prayer, and for receiving the spiritual consolation of the minister in the decline of life, than amidst the din and distractions of a workhouse,

filled with the most heterogenous inmates. The originators of a demoralizing scheme such as public workhouses must have had little regard for the morals and comforts of the poor. Because a man is unfortunately poor in this world's goods, should he be deprived of his little comforts, and separated from his family, and torn from under the roof which has perhaps covered his head from the hour of his birth? Such treatment is cruelty in its most cowardly shape. That it is necessary, nothing shall make us believe, as long as we see the poor in Scotland supported in their own dwellings.

Before Mr Lefevre enters on the consideration of the subjects which occupied the attention of the Committee, he refers to the petitions which had been presented to the House on the pressure of tithe and other local burthens to which the agricultural interest is liable. The attention of Government and Parliament he states to have been particularly directed to these points since the report of the Committee in 1833, and steps, in consequence, have been taken towards the alleviation of acknowledged grievances. He intimates that a bill has just passed the legislature for the permanent commutation of tithe. Tithe has been abolished in kind, and will henceforth be charged on the estate of the landowners. The county-rate has also been made a subject of inquiry before committees of both houses. A commission too, of which Mr Lefevre was a member, was appointed to consider especially what reductions can be made in that portion of the rate which is expended in prosecutions. When the recommendations of the commissioners can be carried into effect, there is every prospect, says Mr Lefevre, that the tax will be so far reduced as that its pressure will be but lightly felt by the agriculturist. An act was passed last session, Mr Lefevre informs us, to distribute the burden of the highway-rate more equitably between all classes of the community. And the effects of the new poor-law bill, it is gratifying to learn from Mr Lefevre, have exceeded the anticipation of its most sanguine advocates. After the enumeration of these wholesome amendments by the legislature, of far greater importance to the English farmer than the reform bill, we presume no one will have the hardihood to assert that nothing could or can be done by Parliament for the English farmer.

A rumour somehow got afloat, that a report had actually been drawn up and submitted to the Committee, the author of the report being Mr Poulett Thomson, president of the Board of Trade, but that it was withdrawn. The truth appears now to be, that Mr Lefevre, unexpectedly made, as he himself acknowledges, chairman of the Committee, was the author of the report, and presented it for consideration. The Committee, however, came to the determination "to report their evidence without observations to the house;" but "it was perfectly open," says Mr Lefevre, "to any other member to have moved some resolution by way of amendment to the report, if the conclusion to which I had arrived, on a consideration of the evidence, were unsatisfactory to him; and if he was of opinion that the evidence would warrant his proposing some specific measure of relief." No one moved such an amendment; and yet Mr Lefevre's report was not adopted, owing, as he intimates, "entirely to the impossibility of advancing any proposition which would meet with a concurrence of a majority of its members." The end of this eventful history is, that Mr Lefevre's report could not secure the concurrence of a majority of the Committee, and that no amendment was moved to it. Uninformed as to whether the report had been put to the vote and rejected, or whether Mr Lefevre feared it would not pass, and did not press it to a vote, we are left to draw our own conclusions on these particulars. One conclusion which we take the liberty of drawing is, that the same acquiescent members who made him chairman could have carried his report, had it been passable; and another conclusion is, that, owing to the discordant materials of which the Committee was composed, it would have been impossible to have brought them to unanimity on any subject. Mr Lefevre alludes to some undefined misstatements on the subject which had appeared in various newspapers,—perhaps to the ascription of the authorship of the report to Mr Thomson; but, if this is a misstatement, Mr Lefevre has not been much misrepresented, for he appears to be a devoted disciple of the same school of political economy. We cannot but think that Mr Lefevre needed too much self-confidence when he undertook to draw up his report from the very voluminous evidence without consult-

ing, as he admits, "any of those gentlemen with whom he had the honour of being associated in this protracted investigation." Having thus been disappointed by the rejection or repression of his report, Mr Lefevre prints the substance of it, with remarks, as an address to his agricultural constituents in North Hampshire. Let us see what the report would have been had Mr Lefevre had his own way.

It has been proved by the evidence that the farmers' *capital* in England is gradually sinking. Different significations may be taken as to what constitutes the tangible capital of the farmer. Every man who takes a farm must possess a certain sum to stock it with seed, live stock, and implements, and, if he agrees to pay fore-rent, which is generally the case in England,—that is, if his first half-year's rent is payable at the end of the first half-year he has possession of the farm, and before he has reaped a crop, he must have, over and above the stocking, at least one year's rent of cash in hand; but should he not pay rent until he has reaped a crop, as is the case in Scotland, then all the capital he absolutely requires is what will stock the farm. We may mark an inference from this, in passing, that the same amount of capital will stock a larger farm in Scotland than in England. A person, therefore, who commences farming must sink, for a time, a certain amount of capital, corresponding with the nature and extent of his farm. When a person takes a farm his expectation is, that he shall lay by a sum every year beyond what is required to pay rent, and farm and personal expenses. This sum, if it exist, is his tangible capital, or the fortune which he is making. During the high prices in the war, this capital accumulated fast, even with extensive improvements and a high mode of living. In peace, when prices fell, capital could not be so accumulated, even with reduction of rent, and economy in living and management. The evidence, we presume, represents this accumulated capital, which is the only *tangible* capital of the farmer, as gradually sinking; and had it not been for the comparative high prices of butchers' meat, wool, and barley, it would have, by this time, disappeared altogether. Corn-farmers can now have no accumulated capital, and their capital invested in stocking is, we fear, partly mortgaged,—a state for the farmer almost tantamount to insolvency. At

best, lowland corn-farmers are living at present from hand to mouth.

“The loss of the farmer’s (tangible) capital has been occasioned by the low prices of corn, and, in the case of farmers of small capital, distress has been aggravated by a continuance of high rents,” says Mr Lefevre. Small farmers whose whole capital is always invested in stocking, will always complain of high rents, whatever they may be. Rather than expose their circumstances they will promise to pay higher rent than they are conscious the land will bear; and should they, by any chance, occupy easy rented farms, the least fall in prices puts them in trepidation. Rents have generally been lowered. To the Agricultural Committee, in 1833, it was proved that rents, to that period, had been reduced 25 per cent., and they are now no doubt lower. One-fourth may not appear a large abatement of rent to a farmer in straitened circumstances; but the reduction is really greater comparatively to prices than at first sight appears. During the war, prices rose rapidly and very high, much more rapidly and higher than rents, and in peace, we may expect, from analogy, that rents will not fall so low as prices,—at least they have not yet. From the nature of things, rents fixed for terms of years must be much more steady than yearly fluctuating prices. A reduction of one-fourth from a small sum fixed as rent is, leaves a smaller sum to be paid than would be left after a proportionate abatement from a large sum, fluctuating as much as prices. But other circumstances than their fixedness combine to maintain rents at a comparatively high pitch. The high character of the landlord,—the good character of the farm as to its productiveness of straw and corn, and its feeding powers,—the desire to be settled in life in a new beginner,—the dread of being obliged to dispose of his stock in one who is about to change his farm,—the fatuitous blindness of all in overlooking the minor drawbacks of a farm, such as its locality, elevation, and neighbourhood,—the mode of receiving offers of rent,—the acceptance of the highest offer by small proprietors,—and the host of competitors which all these circumstances taken together bring into the market, combine to impose an adventitious value on land. Although some of these circumstances may bias the better inclinations

of large proprietors, they can afford to be more liberal, and are desirous of accepting unexceptionable tenants, rather than high rents; hence the lowest rented farms will generally be found upon large estates. Even with all these chances against the tenant, it is true, as Mr Lefevre remarks, that "there is evidently no want of sympathy on the part of landlords, as a body, for the condition of their tenantry." Indeed landlord and tenant are both aware of the inseparable nature of their interests. It may be true what Mr Lefevre says on the subject of rents, although we are inclined to question that the condition of the farmer would have been much better under the circumstances which he states than it is at present, that "if considerable abatements of rent had been made at once at the termination of the war, less upon the whole would have been required, *the capital of the tenant would not have been diminished*, and much of the present distress might have been averted." This is a retrospective remark, and we are all "wise behind the hand," as saith the proverb: But at the termination of the war, neither landlord nor tenant could have foreseen the very low prices of late years, and no tenant would have had the hardihood to demand an abatement of rent of 25 per cent. The fall in prices, gradual as it was, was considered both by landlord and tenant as accidental, in a transition from war to peace; and so far did the tenant think at the time of demanding a large abatement of rent, he cherished the hope of again enjoying high prices,—so true it is, that "hope springs eternal in the human breast,"—when he would again cheerfully pay a high rent. Nay, labourers, as well as farmers, desired the return of high prices.* But had a large abatement been granted by landlords at the termination of the war, although not demanded by the tenants, the case of the latter might not now be different; because the abatement would have only kept them in easy circumstances, and to preserve those circumstances amidst prospective prices constantly on the decline, they would have been induced to spend their capital in improvements as they have really done; and, at all events, the causes which we have enumerated, coupled

* We do not assert that farmers are still desirous for war prices, for they are now quite conscious they can never return,—they are "departed joys, departed never to return,"—but we state what we know was their desire for some years after the cessation of war in 1815.

with the high value of money, always operating to maintain rents above prices, farming must yield small profits. Tenants therefore will never cease to feel rents more oppressively than during the war. Nay, the evidence proves that land in various parts of England does not yield sufficient produce, to pay, at the price of wheat a few months back, the expenses of cultivation, independently of rent. The landlords are not to blame for this unpropitious state of the farmers, nor can they allow their lands to be occupied for nothing, merely to ensure profits to the tenants. To the low price of wheat, then, must be attributed the chief cause of the distress of the farmers in England.

The causes for the low price of wheat are ascribed by Mr Lefevre to the improved agriculture of the country. "Waste lands have been taken in and improved, old grass lands have been ploughed up, light lands, through the turnip system of husbandry, have been made to carry wheat, larger breadths of land have been devoted to the growth of wheat, draining and manuring have enhanced the fertility, and added to the acreable produce of the land, whilst fine seasons have increased the weight, and improved the quality of human food." These are all gratifying symptoms of true improvement. They indicate the enterprising spirit of our farmers amidst discouraging difficulties, and add another instance to many, of the power of moral energy to ward off impending ruin. The rationale of these improvements may be found in the maxim applicable alike to morals and physics, that extremes produce similar results. The extremes of heat and cold produce similar sensations in the animal frame; a piece of frozen quicksilver gives the same sensation of burning to the hand that holds it, as a live coal. In like manner extremely low prices impel farmers as much as high to cultivate the ground, to raise an adequate sum of money. So large a quantity of corn is, from this cause, now raised, that almost no importation of wheat from abroad has taken place for the last three years. The statement given by Mr Lefevre not only of the falling off of the export of wheat from Scotland to the extent of 24,886 quarters annually, but the actual excess of the import of English wheat into Scotland, for the last three years, of 14,972 quarters, indicates the present state of Scottish husbandry, wherein barley is now much

more grown than wheat on every kind of soil. But Mr Lefevre, we conceive, thinks too lightly of the effects of Irish imports of wheat on English prices. According to his own shewing, the excess of wheat sold in the English markets, whose returns regulate the averages, in 1832, 1833, and 1834, over 1829, 1830, and 1831, accompanied with a fall of prices, only amounted to 713,011 quarters. Now the imports of wheat from Ireland in the three years ending January 1836 were 761,827 quarters, a quantity which, coupled with the inferior quality and dressing of Irish wheat, would certainly tend to depreciate prices as much as the English excess. We are rather surprised to hear Mr Lefevre state, that the use of potatoes has tended but little to affect the price of wheat.* The cultivation of potatoes has banished and occupies the place of fallows on land suitable to their growth, since the low price of wheat; and this fortunate change has been accomplished by bone-dust, with which turnips are now mostly raised; for the portion of farm-yard manure which was formerly appropriated to turnips, is now applied to the extension of potato culture. The potato crop, though expensive to raise, is valuable, and it makes an excellent preparation for wheat; but as its delivery is attended with much labour, and its entire removal from the farm leaves no manure, some farmers have undertaken the manufacture of tapioca from the tubers, a process which saves much labour by transporting the essence instead of the bulk of the crop, and at the same time secures all the refuse as wholesome and profitable food for live stock. The quantity of potatoes annually shipped from Perth to London may be computed at from 15,000 tons to 20,000 tons; more we suppose from Dundee, besides from numerous other ports. The increased quantity of potatoes from Scotland must be consumed by human beings or other means, and in either case potatoes must form a substitute for wheat. Potato flour now enters largely into the composition of loaf bread, and puddings and starch are entirely made from it. But independently of any substitute, a diminution in the consumption of wheat, and especially when accompanied with an increase of growth, would lower its price: such a diminution took place, and is quite adequate to account for the very low prices of late.

* Mr Jacob before the Committee of the House of Lords expressed a different opinion.

The country was much excited by the question of reform from 1832 to 1835. Work-people spent much precious time in attending private and public political meetings, and getting up expensive processions, which were tantamount to a loss of money, whilst the neglect of their business at the same time prevented them making more,—a condition quite inapposite to the consumption of bread-corn by work-people. During the period trade was dull, and the price of wheat fell considerably, from 64s. to 38s. per quarter. Since the latter part of 1835, political agitation has ceased, and trade has assumed a briskness, which is more active—whether more sound, remains to be seen—than it has shewn itself for many years. Now this briskness of trade has been accompanied with a rise in wheat of 10s. per quarter; that is from 38s. to 48s. in the aggregate average, and of three-halfpence in the four pound loaf. The conclusion which we draw from these facts is, that the very depressed price of wheat was partly occasioned by want of consumption. We have no more positive means of proving our opinion, but if it be untenable, the concomitant facts which we have mentioned form a curious coincidence. A corroboration, however, may be deduced from barley having maintained its price, 33s. per quarter, from 1832 to 1835, during the great decline of wheat; that is to say, whisky and beer were then in demand, though bread was not, and this is invariably the case when work-people are idle.

Comparatively speaking, the condition of the Scottish farmers is better than that of the English, and the reason of it is given by Mr Lefevre, “that they turn their attention to the breeding, fattening, and general management of stock to a much greater extent than is actually done by the English farmer. The productive powers of the land are increased by the additional quantity of manure thus raised, and it suffers less exhaustion by the less frequent occurrence of the grain crop.”—(p. 12.) A regular rotation of cropping can alone ensure the regular management of any arable farm, and the maintenance of it in good heart. This primary principle is punctually attended to in every now-and farm in Scotland. It constitutes the alternate system of white and green crops. But a still more perfect arrangement is followed in some districts, namely, implanting the breeding and fattening of live-stock upon the alternate system. The management of a certain proportion of grass and tur-

nips is provided to support a suitable number of cattle and sheep which are bred and fed on the same farm, and sold off only when they are fit for the shambles. This is called the mixed system of husbandry, which is less generally adopted than its excellence deserves. Too much risk is incurred by farmers in arable districts in *dealing* in live-stock, that is, in buying and selling, and running the risks of barter. In grazing districts, on the other hand, too little green food is raised for stock in the inclemency of winter. The thousands of heads of cattle which travel into England from Scotland every year, prove the truth of Mr Lefevre's remarks, that more attention is paid to stock in the latter than in the former country. Were, however, the English farmer to follow the example here recommended to his notice, the Scottish farmer would be deprived of a very large market of consumpt, a change much to be deprecated by him; but we predicate erroneously if the commutation of tithes in England will not hasten the change prodigiously. In anticipation of the event, the Scottish farmer should increase the fertility of his land to the highest pitch, by draining and liming, and adopting the mixed system generally, and in the end he will find it to be the most economical method of farming, and a means which will enable him to undersell his English competitors in their own markets.

The substitution of corn for money rents has greatly relieved the Scottish farmer. Money payment, it is true, is the simplest and least troublesome method of discharging accounts betwixt landlords and tenants; but in falling prices it inconveniences tenants to get a large sum together, and it tends to reduce their tangible capital. Could rents be regulated by the amount of produce and its market price, both landlords and tenants would be placed in a pleasant and equitable footing, the one paying, and the other receiving, the current value of produce. But unfortunately for this just arrangement, it is, in most cases, as difficult a task to fix the amount of the produce which should be valued at the current price, as it is to fix a money-rent. On a farm entirely devoted to the raising of corn, an approximation to the proportion of gross produce which should be appropriated for rent might be made, and were rent paid in corn, that proportion of produce would have simply to be handed over

to the landlord ; but the moment that other produce, as well as corn, is introduced into the calculation, a complicated system arises. The proportion of other produce then must be ascertained as well as corn ; and the various commodities which compose the other produce besides corn, must bear a proportion relatively to themselves as well as to corn, that no more than the true proportion of the whole produce of the farm may be appropriated for rent. That the amount of the produce thus ascertained may continue to be the true proportion appropriated for rent, it should not be a fixed quantity, but vary according to the increased or diminished capability of the soil during the currency of the lease or occupancy of the farm. Satisfactory as would be the ascertainment of the amount of the various productions which necessarily fluctuate with the condition of the soil, and vicissitude of the season, the true rent would only be ascertained by valuing that amount at the current prices. Now, although the current prices of produce are not actually taken as a calculation of rent, but only their average once a-year, at the striking of fairs, the true rent could be truly ascertained by the average of fairs, provided that the time of striking the fairs gave the true average price of the year, and this average were applied as a calculator to the produce fluctuating in quantity and proportion during the currency of the lease. But as the amount of produce is fixed for the lease at the time the land is taken, the present system of corn rents can only be an approximation to the truth, and is inapplicable, as well to the varying condition of the land as the vicissitudes of seasons. For example, with abundant crops and low prices, corn rents are very favourable, but with scanty crops and high prices, they are ruinous to tenants. To avoid the latter evil as much as practicable, a system of compromise is adopted, a maximum of value being fixed above which the rent cannot rise, and accompanied with a portion of fixed money payment, " the most perfect system would perhaps be," as Mr Lefevre suggests, " to allow a portion of the rent to vary with the price of that description of corn which forms the ordinary produce of the farm, and the remainder to be a fixed money payment."—(p. 12.)

But the greatest difficulty to be encountered in settling any rent of a farm is the fixing the proportion of the gross

produce which the landlord is entitled to receive for his share. The rule of our fathers used to be, "Divide the gross produce into three equal parts, and give one to the landlord, retain another for the expenses of management, and give the third to the farmer for his household expenses and profit of stock." Were this rule universally applicable and strictly enforced, the farmer would have no cause for complaint. As it is, it is not practised, whether it be applicable or not, and all the deviations from it tend to the injury of the farmer. On land of superior quality the landlord receives more than the third, and on inferior soils the expenses of management greatly exceed a third. Thus, to place the farmer, again, in easy circumstances, both the expenses of management and amount of rent should be reduced. We have given our reasons for thinking that rent will never fall so low as the prices of produce, and the only mode practicable, in our opinion, of reducing the expenses of cultivation, is the substitution of inanimate for animate labour,—a mode of relief which we have frequently and assiduously pressed on agriculturists to adopt. We know they entertain no apprehension as to its practicability, and whenever the discovery is presented to them in a tangible form they will instantly adopt it.

In a statement given by Mr Lefevre (p. 11), it appears, that for years past the expenses of farming, including rents, have been much less in Scotland than in England on land of equal quality. Thus land that yielded thirty bushels of wheat per acre in England, at a rent of 35s., cost in expenses L.4, 15s.; in expenses and rent L.6, 10s. per acre; whereas the same quality of land estimated by the same produce, and at the rent of 39s., only cost L.2, 16s. in all L.4, 5s. per acre; the difference being L.2, 5s. per acre. Viewing this statement arithmetically, L.2, 5s. constitutes a vast difference in the expense of cultivating one acre, for it absorbs either of the rents, and something more, or taking the difference between the above expenses, the amount of the Scottish rent of 39s. is entirely saved. But too much should not be drawn from this statement against the English farmer, in the absence of many required particulars, such as the assumed method of calculating the expenses. If the expenses are not calculated on similar data, there can be no analogy in the results, and even if they had so been calculated, the comparative industry in

the application of labour should not be overlooked. Calculating corn consumed by men and horses, and in seed, at the market prices of the time, and the price of labour as if paid by the day or the job, can give none but fallacious results. A farmer has no right to estimate the cost of these items of expense at more than *they really cost him*. It is amusing to observe the precision with which fractional and proportional items of expense are given of farming, when, in truth, no farmer can give any information on the complicated subject.

Mr Lefevre alludes to the existence of a strong prejudice in the farmers of England against long leases. On large estates belonging to families of high and old established character, it matters, we believe, very little to the farmer whether he has a lease or not. The land is valued to the changed circumstances of the times by bailiffs, on the golden rule of "live and let live;" and the tenants have themselves to accuse of dishonesty, intemperance, or neglect, when they are constrained to leave such properties. The tenants of the Duke of Northumberland, in Northumberland, have no leases, and yet where can a more industrious and thriving body of tenantry be found? On the other hand, the tenants of Lord Panmure, in Forfarshire, have leases, and where can be found a body of tenantry in easier circumstances? In fact it is not the written, it is the heartfelt understanding between landlord and tenant that constitutes the true lease, and establishes that confidence which promotes improvements. One advantage the last-named indulgent Lord has over the munificent Duke in granting leases; his Lordship is thereby enabled to inscribe and sign on the leases, and which he invariably does with his own hand, that glorious precept of agricultural prosperity, "*Live and let live*." But in general leases are absolutely necessary to establish and maintain mutual confidence between landlord and tenant; and are especially "well deserving of encouragement in those parts of England where the land is impoverished by previous bad management," as is truly remarked by Mr Lefevre. The duration of leases, however, is a subject which admits of discussion. We are inclined to think that a term of years forming a multiple of a given number of years, and the component years of the rotation of cropping suitable to the nature of the soil of the particular farm for which

the lease is intended, would be better than an undefined term of nineteen or twenty-one years. By such an arrangement a farmer would be enabled to complete, during his lease, the same series of rotations on every field of his farm.

Every one will cordially second Mr Lefevre's recommendation of draining to the farmers of England. It forms the fundamental basis upon which every improvement in land should be reared. It is the ameliorator of "stiff retentive subsoils," and the fertiliser of "thin shallow soils." It is "calculated to render the most unproductive soil fertile and profitable." These attributes are common to every kind of draining; but supereminently so to thorough draining, the use of which, we conceive, to be the most important *means* of increasing the fecundity of soils that has ever been introduced into the husbandry of this country. The mass constituting the soil and subsoil, concreted and indurated by stagnant water, is thereby rendered absorptive and friable. All these effects may be produced by thorough draining on every kind of soil which requires draining at all, but which Mr Lefevre too ardently ascribes to the operation of Mr Smith's subsoil *plough*. That plough is an excellent and efficient implement as a follower of draining in certain situations, but the four-horse plough, *after draining*, will also break up the most obdurately incrustated subsoil to the depth of fourteen or sixteen inches; but subsoils containing large imbedded boulders cannot be effectually *ploughed*, and, for our parts, we never yet saw a subsoil which had been drained and thrown up that could not be speedily ameliorated by cultivation. Ploughing becomes an easy operation, and the most inveterate soil or subsoil is rendered innocuous by thorough draining.

The remedial measures recommended by the witnesses were the introduction of poor laws into Ireland, the allowing farmers permission to malt their own barley for consumption on their farms free of duty, and a repeal of the malt-tax.

Into the subject of poor laws for Ireland Mr Lefevre does not enter, as it formed a distinct branch of inquiry by the Poor Law Commissioners of Ireland. We shall not, therefore, at present say much on the subject. The introduction of poor laws into Ireland will always be attended with many difficulties. It will be proper or improper, in our opinion, according as the plan of supporting the poor in England or in Scotland is adopted. If

the principle of supporting able-bodied labourers when out of employment be recognised as in England, the paupers will consume much of the landed property in Ireland. The moment it becomes understood that people who cannot find work are fit objects for the poor-roll, thousands will apply, many of whom no doubt will be very fit objects of charity, but many more, though poor enough, will certainly not be fit objects of charity. A vast deal of the misery discovered by the Poor Law Commissioners in Ireland, and depicted in their report, may be accounted for by well known circumstances. Many labourers in the south and west of Ireland are out of employment, not because there is really no employment to be found, for, as Mr Lefevre states, evidence was adduced to the Committee that the condition of the tenantry is not retrograding, that that of the larger farmers is decidedly ameliorated, and that many improvements are in progress by landlords in draining land and reclaiming bogs, and crossing cattle with the best English breeds, all sources of permanent employment; but because they cannot be depended on as steady workers. They are either proprietors, that is, proprietors of perpetuities, or are the relations of such proprietors, whose possessions they expect to divide among them. They have to work their own land, and probably cannot, or, at all events, will not remain from year to year in their employer's service. Hence they can attend neither to their own nor their employer's interest. Are proprietors to blame in such circumstances, because they will not employ them when and as they please, and will not humour them in their "provoking indolence?" The wretched management of their own lands shews how regardless these labourers are of the means of their own subsistence. They scarcely cultivate any thing but potatoes, which form their sole food, and even their necessary cultivation is neglected at the proper season. Hence potatoes are planted at all seasons all late in autumn, and those upon which they subsist are only dug out of the ground when wanted, although it should be winter, perhaps in the midst of frost and snow! Can any fate less than famine and disease attend such conduct? Amidst such improvidence, to introduce English poor laws would only be to invite all these improvident but sufficiently able-bodied creatures to flock to the poor-roll, whilst they keep possession of their lands. This is one horn of a dilemma.

But if the principle of the poor-laws in Scotland were to regulate those of Ireland, the indigent, the sick, the impotent, the aged, would only be supported. Were they alone supported, the cause of the complaint that undue advantage is given to the Irish farmer, who is thereby entitled to undersell the English farmer in his own market, and that it is the miserable condition of the Irish labourers which induces them to come to this country in hordes in search of employment, would not be removed. This is the other horn of the dilemma, and how both or either of them are to be surmounted, " 'twould puzzle a conjuror." It is obvious that the difference of wages in Britain and Ireland, is the chief inducement to Irish labourers to emigrate to this country; and unless the allowance to able-bodied labourers would be nearly as much as the ordinary wages in Britain, no system of poor-laws in Ireland can prevent that immigration of which the agriculturists here so much complain; but the wages of the two countries cannot assimilate, until the condition of the people assimilate. As to the work-house, that rod in pickle reserved for the back of the Englishman who dares to supplicate for parochial charity, it will possess no terrors to the Irishman, who is habitually accustomed to nestle with his family in a mud cabin, on musty straw in a bundle of rags; nor will a stinted diet curdle in the stomach of him who is accustomed to subsist twice a-day on bad potatoes and butter-milk. We believe it to be truth, that the really poor in Ireland are as amply supplied with pecuniary support, and household comforts, as they can possibly derive from any system of poor-laws; and they, moreover, possess the inestimable benefit of receiving those supplies in their own dwellings, from the truly charitable. We fear that if a system of poor-laws is introduced into Ireland, it will be the cruel work-house system of England, and not the domestic and humane system of Scotland. Still, in order to assimilate the condition of Irish to that of English labourers, poor-laws must be established in Ireland. It is the opinion of most men in Ireland, that a poor-law, founded on the principle of poor colonies, such as those of Holland and Belgium, would be more applicable to the condition of Ireland than either the poor-laws of England or Scotland.

With respect to the malt-tax, it appears to be a favourite argument with the friends of agriculture, that its repeal would

create an increased demand for barley. Mr Lefevre (p. 17) not only makes a negative admission to this effect, that "it is impossible not to admit that *any reduction* of the malt-duty, would cause an increased demand for barley," &c.: but in another place (p. 21), he conceives, that were the duty reduced without a countervailing measure, the price of barley would rise greatly above its present price. "If it were attempted," says he, "to reduce the malt-duty one-half, without any alteration in the existing corn-laws, the effect would be to create *such a demand for barley as would raise its price* (until fresh lands could be brought into barley cultivation) *to an average at which foreign barley might be admitted at a mere nominal duty.*" As Mr Lefevre thus conceives that "the reduction of the malt-duty is so interwoven with the question of the corn-laws" (p. 17), that the one question cannot be discussed without considering the other, it is necessary to investigate how the reduction of the malt-duty would really operate to raise the price of barley, or whether it would raise it at all.

Barley is made into flour, pot and pearl barley, food for live stock, and malt. Barley-flour, and pot and pearl barley, are solely confined to culinary purposes; and it is only the light barley or winnowings, or what barley may be stained by the rain, that is given to animals. By much the larger proportion of the barley crop is distilled into spirits, and made into malt. As the duty only affects the malt, it is only that portion of the crop which interests our investigation. The quantity of malt made in the year ending 5th January 1835, was 5,361,506 quarters, which, allowing for a small increase of bulk in the process of malting, would require 5,000,000 quarters of barley. This quantity of barley, according to Mr Lefevre's data, as stated at p. 20, would require 1,600,000 acres to grow upon, an extent exceeding, by 70,000 acres, the whole land computed to be in barley culture in Great Britain. It has been computed by Sir John Sinclair and others, that barley annually occupies in Great Britain, exclusive of Ireland, 1,530,193 acres, and taking the average produce at 36 bushels, which we conceive to be very near the mark, the quantity of barley available for other purposes than malt is 1,885,868 quarters, but as the barley culture was increased since Sir John Sinclair's computation, we may state its quantity now at 2,000,000 quarters, a quantity not exagge-

rated when we consider the quantity of barley which is distilled into spirits, and even made into ale and beer, and manufactured for domestic purposes. Were the malt-duty entirely repealed, there would be no economy in making spirits and beer from barley instead of malt. The immediate consequence of the repeal would be an increased demand for malt, to meet which, all the raw barley used at present in making spirits would be converted into malt; but no more barley of course would be required than at present, unless the business of the distiller and brewer increased. The conversion of the entire barley into malt, would, however, only be a consequence of the entire repeal of the malt-duty, for were the duty reduced only one-half, raw-grain distillers would still distil from barley more economically than from malt. Since, therefore, the entire repeal could not increase the demand for barley, much less could the reduction of one-half of the malt-duty, unless there were an increase in the business of the brewer and distiller: and the increase in the business of the brewer and distiller could only arise from an increased consumption of cheaper liquors. It is questionable, however, that Government would permit the price of spirits at least to be lower than it is at present, when it is acknowledged at all hands that it is already lower than is beneficial to the morals of the people. The plea of Government against the repeal, or even the reduction of the malt-tax, being their inability to sustain the revenue without it, it is not probable that they will consent to lower the prices of spirits and beer, even although they should yield the reduction of the malt-tax. Until, therefore, we are assured of the increased consumption of spirits and beer, as a consequence of the reduction of the malt-tax one-half, we have no grounds for supposing that an increased demand for barley will arise. The only sure demand for barley, were the malt-duty repealed, would be from farmers themselves, who would then partly feed their live-stock on malt when the price of barley was low, or when the price of live-stock was high. This demand, in some seasons, might be considerable, but the demand for barley, under any circumstances, would never be overwhelming, as Mr Lefevre wishes to represent it would be with a reduction of one-half of the malt-duty, (p. 21.) The truth is, that a reduction of one-half of the malt-duty would as much prevent farmers from using malt for

their live-stock as the present duty ; but the free use of malt " would alone operate most beneficially on the interests of agriculture." " It," namely the free use, but not the mere reduction of duty to one-half, as Mr Lefevre imagines, " would not only encourage draining, and the improvement of clay-land, from which most important results may be anticipated, but it would check the over-cultivation of wheat, lead to a better cultivation of crops, and also to a *greater reliance on the profits of stock*," by feeding. We agree, however, with Mr Lefevre, that it would be inexpedient to allow the privilege of malting barley free to farmers, so long as a malt-duty existed. Such a permission would certainly place them under very suspicious circumstances.

In discussing the reduction of the malt-tax, Mr Lefevre seems to have forgotten his usual candour, and argues as if he had a particular purpose to serve. Indeed, many of his arguments appear to us positively disingenuous. He takes it for granted, for instance, that only one-half of the malt-tax can be reduced, when the farmers petition for a total repeal, for no other apparent reason than because the Commissioners of Excise Inquiry recommended it some years ago. He assumes it as matter of course, that a reduction of one-half in the malt-tax must cause a great increase of demand for barley ; and, relying on this assumption as undeniable, he maintains that the price of barley would thereby be so greatly and suddenly increased, as to render it necessary to admit foreign barley at a low duty ; nay, he thinks that so much of the wheat land would be taken up with the extended cultivation of barley, that foreign wheat must also be admitted at a low duty ; and his opinion is, that the questions of the reduction of the malt-duty and the existing corn-laws are so interwoven, that the one cannot be discussed without the consideration of the other. These opinions are all pure assumptions.

He assumes, we have said, that only one-half of the malt-tax can be reduced, and that the reduction will cause a great increased demand for barley. We have shewn that the *total repeal* of the malt-tax would create a demand for malt, which would be supplied by the conversion into malt of the barley at present used in a raw state. The oats and wheat used in distillation would also be replaced by malt, and which substitution would so far make a demand for barley ; but the great demand for barley would arise from the farmers themselves, who would be

induced to feed live-stock with malt when the price of barley was low, or when the price of stock was high. The extent of this demand is impossible to predict. There are no other sources from which a demand for malt or barley could arise, unless indeed, from an increased consumption of beer and spirits; but, as we have stated, it is not probable at least that Government will permit a reduction in the price of spirits. But none of these results would be obtained to a sensible degree by a reduction of the malt-tax to one-half. The advantage of that reduction would chiefly be enjoyed by the brewer and the distiller and not the consumer, as was the case in the reduction of the beer-duty, leather-tax, &c. The farmers would certainly not venture to feed their stock on malt, and distillation from oats and wheat would be carried on at a cheaper rate than with malt at a reduced duty of one-half.

Mr Lefevre also assumes, that a reduction of one-half of the malt-tax would cause such a great and sudden demand for barley, that, until a sufficiency could be raised in this country, foreign barley should be admitted at a low duty. We have shewn that the repeal of the whole malt-tax would alone cause a demand for barley, and that demand would be confined to farmers, and distillers from oats and wheat, unless the consumption of beer and spirits were increased by a reduction of their price. The application of malt to the feeding of live-stock on a repeal of the malt-tax could not be greater or more sudden than barley could be grown for the purpose; for the demand and supply being both in the farmer's own hands, the one would be regulated to the other, as best suited the working of the farms. But although a great increased demand for barley should arise from brewers and distillers, it could not be available to them until the extension of their premises, which would require time as well as the raising of barley. In either case, the demand could not be sudden; and in both cases it would be consequent on the repeal, and not on the reduction of one-half of the malt-tax. Besides, the repeal would be fixed at a prospective period, so as to avoid a sudden impulse, to enable farmers, as well as brewers and distillers, to conform their operations to the anticipated circumstances.

Mr Lefevre assumes, that the increased demand for barley consequent on a reduction of one-half of the malt-duty, would

encroach so much on the land appropriated to wheat, that the duty on the import of foreign wheat would require to be reduced. We have shewn that a total repeal of the malt-tax would alone cause an increased extension of the growth of barley, by the feeding of live-stock, and the cessation of distillation from oats and wheat. But assuming, with Mr Lefevre, that a reduction of one-half in the malt-duty would extend the growth of barley, it does not follow that its extension would entirely encroach upon the land appropriated to wheat. Barley grows excellently upon lea; and it is as probable that oats, as well as wheat, would have to give way to barley in arable lowland districts. But wheat will always be grown in this country at whatever price. Fallow-wheat will be nearly abolished, but spring-wheat after turnips will always be sown in open weather during winter, upon lands and situations suitable to it, whatever be its price. Good wheat will keep, and will always be in request. But assuming again, with Mr Lefevre, that 2,500,000 additional quarters of barley will be required to supply the demand on a reduction of one-half of the malt-duty, and that this additional quantity will compel the withdrawal of 600,000 acres from wheat which, at 20 bushels per acre, would make a deficiency of 1,500,000 quarters to be annually provided for, this quantity, Mr Lefevre assumes, must be provided from abroad. We do not perceive the necessity for a foreign import. Computers estimate that one quarter of wheat is annually consumed by every person in Britain. Taking the population at 16,000,000, that number of quarters of wheat are annually consumed. The deficiency estimated by Mr Lefevre is 1,500,000 quarters, which is less than a tenth of the annual consumption. Now 20 bushels per acre being what Mr Lefevre assumes as the average produce of wheat, a tenth added to them, viz. 2 bushels, will guarantee the supply of the annual deficiency of 1,500,000 quarters. But how are the additional 2 bushels per acre to be raised? Any reduction of the malt-duty, according to Mr Lefevre, "would not only encourage draining and the improvement of clay land, *from which most important results may be anticipated.*" (p. 17.) Would not a change in the proportion of the wheat and barley crops effect an amelioration of the soil and system of cropping, and would not an ameliorating system increase both the fertility of the soil, and the acreable produce of

both kinds of grain? These results being granted, would 2 bushels per acre be an exorbitant increase of produce? Since the war, 12 bushels per acre have been the increase in barley in Scotland. Why, then, import foreign wheat?

Mr Lefevre assumes that the questions of the reduction of the malt-duty and the existing corn-laws are so interwoven that the one cannot be discussed without consideration of the other. Cannot a malt-duty be imposed without the enactment of corn-laws; and cannot corn-laws exist without a malt-duty? Who doubts the possibility of their separate existence?

Mr Lefevre next remarks on the corn-laws, without interweaving them with the malt-duty. His opinion is, that they should be abrogated, and a fixed duty imposed on imported corn: the duties should be 10s. per quarter for wheat, and 3s. or 4s. for barley. Without stopping to determine whether a better system of corn-laws than the present could be devised, we agree with Mr Lefevre in his objections against them: "The tendency of the present corn-laws," says he, "has been to raise prices unnaturally during years of import, and at the same time to expose the agriculturist to a large influx of wheat (which happened in 1831) immediately before the harvest, when the price is usually the highest; but this supply is not in the smallest degree regulated by the wants of the public; it is probably the accumulation of months, which the merchant has been induced to withhold until it can be introduced at a mere nominal duty. In the event of a favourable harvest succeeding a large admission of foreign corn, the farmer has to struggle against a depreciation of his produce, beyond what is the natural result of an abundant season; on the other hand, if the harvest prove unfavourable, the natural rise in the price which would compensate him for the deficiency of his crop, is checked by the presence of a large quantity of foreign corn in the home market." These objections were stated by petition to Parliament before the present corn-laws were enacted in 1828, by the landed interest of Scotland. At that time we ourselves took an active part in forwarding petitions to the Legislature, and had ample opportunity of learning the sentiments of Scottish agriculturists on corn-laws in general. But their remonstrances were overruled; and it is too much for the advocates of free trade, of that kind of free trade presently pursued by this country of reciprocity all

on one side, presenting to smiling Europe a striking instance of self-abasement by an intelligent nation, for the sake of a theory, —to taunt the agriculturists with upholding the imperfections of laws, against which they earnestly remonstrated. We are therefore quite prepared to deny that these laws were a delusion, as Mr Lefevre expresses it (p. 22), on agriculturists, or that agriculturists ever imagined it in the power of any corn-laws to secure high prices for corn. They know the difference between a good and a bad season, between 1815 and 1816, between a good and a bad crop too well, to be deluded into the belief that corn-laws can affect the seasons; nor are they such novices in political economy, as to misunderstand that superior cultivation and abundant crops must lower the prices of corn, independently of any legislative enactment. The free traders, it is true, attempted to delude both the people and the agriculturists into the belief, that, were the law under discussion at the time passed, the price of corn would not fall below the maximum rate, 80s. They certainly succeeded in deluding the working-classes into the belief that bread would be beyond their power to purchase it, and hence the unpopularity and outcry against the corn-laws; but they as certainly failed in deluding agriculturists into the belief that the prices of corn would never be low. We remember, in the discussion of the corn-laws in 1815, Alderman Birch, who was a confectioner, and should have known better, solemnly stating in the House of Commons, that were those laws passed, the quartern loaf would never be below eighteen-pence in England! It is therefore untrue to state, that agriculturists ever believed that corn-laws could maintain prices beyond what the supply and demand for corn can justify. Agriculturists deserve the protection of corn-laws against foreign competition, because they are severely taxed, in comparison with the foreign farmer. This protection, no doubt, prevents prices falling so low as in an unlimited competition, but it cannot prevent the fall of prices by an increase of home produce. Believing that the state of taxation affords the only rational ground for enacting corn-laws, whatever may be their details, we cannot assent to the assertion made by Mr Lefevre (p. 22), that “the avowed object of the Government in passing that law (of 1828), was to secure a steady range of prices varying (in wheat) from 60s. to 64s.” Their “avow-

ed object," as we well remember, was to "*secure*" an ample supply of foreign corn at home in bond, by tempting speculators with a long range of fluctuating averages, which, if high, would open the home market for a time at a nominal duty. The bait took, and Government secured their "avowed object;" but the speculators have since locked up their capital with their corn in bond. Nor were the Government to blame for the attempt, notwithstanding they were warned that the success of their plan would injure the landed interest; for they believed at the time that this country could not grow sufficient corn to support its inhabitants. The bill could *not* secure a steady range of prices.

Mr Lefevre almost ridicules the "attempt to ascertain what is a remunerating price to the farmer, because in 1814, 96s. and 80s. per quarter were considered the lowest average prices at which wheat could be grown; whereas, now, it is stated by some persons that 40s. are sufficient to secure a profit, and several witnesses concur in considering 50s. to 56s. to be quite sufficient," (p. 24.) Farmers find no difficulty in ascertaining what is *not* a remunerating price. They find that when an average produce at a certain price cannot pay their rent, they naturally conclude that the price is not remunerating. But is it marvellous that different prices should remunerate under different circumstances? In 1814, the prices of every thing were high, and the value of gold had not been reduced to a standard. Since then, low prices have acted as a strong stimulus to the cultivation of land, which is now managed in a more fertilising system, and under a better rotation of cropping, and of course yields a much larger produce, and of finer quality than formerly; besides, rents and certain expenses have been since reduced. It is in this way that increased quantity and improved quality remunerate the farmer for the reduced price.

As we have no intention of following Mr Lefevre into the details of the corn laws, we shall not inquire into the prices at which corn can be imported, or into the prices of grain at the shipping ports abroad, or whether the striking of the averages can be amended, or whether a fixed or fluctuating duty is the more likely to secure steady prices; it is unnecessary, for we are not concocting a new corn-law, and these topics would lead us, as they have led Mr Lefevre, into a labyrinth of speculation. One

paragraph, however, we shall quote in connection with these subjects, to shew that Mr Lefevre cannot relinquish his favourite idea, suggested to him by the Commissioners of Excise Inquiry (Sir Henry Parnell), of "the repeal of half the malt-duty;" nor forego the favourite but inconsequent maxim of the free-traders, that "a certain demand created for wheat from the Continent," "would afford a stimulus to the manufacturing interests," a maxim which he may see daily violated by our ships passing to the Baltic in ballast. In this paragraph we beg to hint, that a slight inconsistency seems to pervade his statement, that were Mr Sanders's suggestion adopted, of the duty on wheat never being permitted to go below 5s. per quarter, the average would be *greatly augmented* above 56s. per quarter; while, at the same time, he cannot suppose it to be for "the interest of the farmer that the price of corn should be very high." We suspect that Mr Lefevre himself would be amongst the first to declare the price of wheat, if "greatly augmented" above 56s. to be "very high." The paragraph is evidently the offspring of a sanguine mind, unconscious of the workings of self-interest in the various classes alluded to, and who, although "indissolubly united," will each assuredly promote its own share in its own way for the consummation of the happy picture delineated. Pity that so easy a road to happiness and wealth should be neglected by those whose interest it is to walk in it. "Were the suggestion of Mr Sanders adopted," says Mr Lefevre, "the probability is, that an average varying from 50s. to 56s. might be sustained without difficulty, and if accompanied by the repeal of half the malt-duty, and a certain demand created for wheat from the Continent, it is more than probable that this average would be greatly augmented; at the same time it would afford a stimulus to the manufacturing interests, insuring increased prosperity to the operative classes, and a greater consumption of all other articles of agricultural produce. But let it not be supposed that it is for the interest of the farmer that the price of corn should be high. It is infinitely more important to him that it should be steady, with as little fluctuation as possible, beyond what must always necessarily follow from the effects of favourable or unfavourable seasons, and that the labouring population should be abundantly supplied with the first

necessary of life, insuring, as this must do, a lower rate of wages and a better rate of profit, both to the agriculturist and the manufacturer, whose interests are indissolubly united." (p. 25.)

We have never been of those who fear that with a low price of corn, any considerable extent of land will cease to be cultivated. Not only will "the energy and skill of the British farmer enable him to overcome this difficulty," as Mr Lefevre very justly observes, but the land thus doomed to sterility by the fears of people, is most useful and profitable to the farmer. This inferior land is most devoted to the growth of turnips, and is decidedly the cheapest rented. The high value of stock, and the facility afforded by bone-dust, will always insure a steady demand for good crops of turnips, and as barley is the most appropriate crop after turnips, such land yielding a greater crop of barley after turnips than any other sort of grain, so the value of turnips and barley together, combine to make this kind of land yield greater profit to the farmer, in conjunction with that of finer quality, than land of higher rent. It will therefore not be thrown out of cultivation. Nor will it be laid down to permanent grass, because land of inferior quality never grows good permanent pasture, and if so kept reverts to its pristine condition. But the high value of stock will always maintain a large breadth of pasture grass, whilst the low price of grain will cause land of superior quality to be devoted to grain culture, to ensure a larger acreable produce. The effect of all this will be, to depend chiefly on the inferior land for pasture, and in order to ensure the requisite quality of grass for the stock, its course of rotation will be extended in the term of grass, whilst it will still take its turn in arable culture. To corroborate what we have just advanced, we have observed no land of inferior quality thrown out of cultivation; on the contrary, we observe the stimulus of low prices daily urging the cultivation of more waste land. We need only refer to the papers on the improvement of waste land which have lately appeared in the *Highland Society's Transactions*, in corroboration of the correctness of these remarks.

The statistical information desired by Mr Lefevre "of the quantity of land in each parish employed in grain cultivation,

stating the number of acres sown with wheat, barley, and oats, and the probable produce of the next harvest," would be of general interest, and of great importance to the statesman and political economist. It would be useful to persons engaged in the corn trade, in regulating their speculations; but speculators could only regulate the supply of foreign corn to the demand in the home market, or "reduce the elements of fluctuation in price," as Mr Lefevre theoretically expresses it, when the home growth became barely sufficient for the home consumption, because in years of plenty their speculations could have no effect on the supply in the home market. The statistical information would be of little use to the farmer, because his fields would be occupied with the growing crops before it could be published; the rotation of cropping determining the acreable extent of each farm every year.

Several petitions were referred to the Committee by merchants and others interested in the foreign corn trade at Liverpool and Plymouth, praying for a renewal of the grinding act, or "that for every barrel of British flour exported, the merchant should be entitled to a certificate, authorizing him to release, at any future time, as much foreign grain as could be liberated by the amount of duty payable on the import of a barrel of foreign flour at the time when the export was made," (p. 32.) By the bare relation of its terms this is shewn to be a complicated proposition. If it is desired by the speculators to be permitted to grind foreign wheat in bond into flour, or make it into biscuit, in order to compete with foreigners abroad in the provisioning of our ships and colonies, there can be no objection to the proposition, under the condition, that the flour or biscuit thus made shall be immediately exported. This permission would enable them to compete with the Americans and Hamburgers, whilst it would prevent the risk of fraud at home in the rebonding of the flour or biscuit, or mixing it up with the question of the export of British flour. If this simple plan does not suit the purpose of speculators, agriculturists may be assured, there is more in this very complicated proposition than "meets the ear." We have access to know that machines have lately been erected at St John's, New Brunswick, for baking biscuit with such celerity that each of them may throw off

800 in a minute. The biscuits are intended to be supplied to the Newfoundland fishermen ; but the flour must be mostly obtained from the United States, as Canadian flour is yet too scarce and dear. Newfoundland might thus be made a good station for speculators from which to compete with the Americans with flour ground in Britain of Baltic wheat ; and so might the West Indies and South America.

The currency question is the last subject which occupies the attention of Mr Lefevre, and he enters into it very generally. He could scarcely choose to do otherwise, after the *caveat* which the Ministry, who formed the Committee, entered against its discussion. His observations, in these words, are apparently intended as a *quietus* to the subject. " The question," he says, " has been so long settled, that it cannot again be entertained without serious danger to every interest in the state ; and it is impossible for one moment to suppose that the legislature would sanction an alteration which would endanger all the existing contracts in the country." As a *question*, it will not be set at rest until it receives a thorough discussion and investigation. The investigation and discussion would not necessarily alter the present standard of currency ; but they would satisfy the minds of reasonable men. But it is curious to observe the excessive irritation of those who advocate the present condition of our monetary system, whenever the subject is remarked on. They conceive the subject too serious to be meddled with ; to agitate it would be to convulse the country, to break " existing contracts," to plunder the public creditor, and to sacrifice the national faith. Now, whatever difference of opinion may exist on the extent of the change effected on the condition of all classes of people, either for the better or the worse, by the alteration of the value of gold in 1816 to the standard of 1797, it cannot be denied that the change was great ; but the change was also sudden, for the moment it was recommended in 1816 its effects began to be felt by anticipation, although the matured measure did not come into operation till years after, in 1822. Since the change in the value of gold was then] great and sudden, and since a change in it, as we are told, must always be attended with danger, how is it that the same irritable people who now shudder at the proposed discussion of the question, then felt no

dread of breaking "existing contracts," of plundering the public debtor, of staking the national faith for a larger sum than it was pledged for; how is it, in short, they denied that harm would arise from change then, and insist that harm will arise from change now? And yet, from 1822 to this, after many years of experience, the landed interest have felt all the burdens on land increased; proprietors have felt more heavily the pecuniary family engagements imposed on the land than on taking possession of their estates; owners of entailed estates have felt their personal pecuniary engagements more difficult of liquidation, whilst the rents of all have been lowered; and tenants, finding no profits, have struggled for existence. How is it that these difficulties have been experienced by the landed interest, under a change which was to bestow undoubted benefit on every class of the community? Mr Lefevre consoles than by saying, that "these difficulties are rapidly passing away"—(p. 35). The difficulties of commercial people, whose capital floats about and quickly changes hands, may rapidly pass away, but the engagements of the landed interest have not so ephemeral a character. Theirs are permanent burdens, to redeem which now-a-days their estates must be sold to the more favoured money capitalists, whose power to purchase land has been increased by the change in the value of gold. But to estimate the increased burdens on land in a tangible shape, we have only to convert the money value of those engagements into quarters of wheat, and calculate the enlarged extent of land which the wheat occupies at the present time, to produce the quantity that will realize at present prices the amount of those engagements. The extent of land will be found to be doubled, after making allowance for its increased fertility. And yet we are told that the difficulties of the landed interest are "rapidly passing away." Is the national debt also "rapidly passing away?" We cannot believe the statement. We do not profess to demonstrate the difficult problem of money; but we perceive no peculiar sanctity about the subject which should prevent its demonstration more than any other proposition in government, especially after experience enables us to understand the subject more thoroughly. It is now generally acknowledged that the report of the Bullion committee of 1811, upon which our present monetary system is founded, contains many serious errors, and

there is no doubt that much light has been thrown by experience on the subject of money since the discussion of the gold standard in 1816. A well tempered discussion, therefore, of the subject would do no harm, but greatly tend to settle the minds of ordinary people, who cannot easily discover why the gold standard of 1797 should be made to regulate the pecuniary transactions of 1836, after the habits, tastes, wants, and condition of all classes have been so much altered. If gold is not to be allowed to be a variable commodity, and conform itself to the circumstances of the times, like every other commodity, and as man himself conforms to them in his moral, social, and physical condition, then why not adopt the standard of 1597, the "golden age of Good Queen Bess," instead of 1797? The attempt to conduct the ordinary transactions of a great nation in gold must be attended with great expense. Believing it to be so we have always doubted that England could afford to conduct in gold the innumerable daily transactions of its populous and active inhabitants in sums under L. 5. If the plan were really economical to the government and accommodating to the community, there surely would not be so many complaints against it. But the fact is, the precious metals having an intrinsic value of themselves like every other commodity, as well as being a sign of value like paper money, they will be made the object of barter as often as it suits the interests of speculators in coin. The circulation may thus be contracted to an inconvenient degree for the daily wants of the people, and coin become scarce in the country. On the other hand paper having no intrinsic value, but only being a sign of value, forms a circulating medium which cannot be bartered. On these accounts we prefer in Scotland, paper, with its liabilities, to gold, as a circulating medium,—one pound bank notes to sovereigns. Besides we thus have individually much less inconvenience in managing our pocket-money of paper and silver, than the English with their gold and silver and paper.

Having followed Mr Lefevre pretty closely through all the subjects broached in his letter to his constituents, we shall now be able to ascertain what remedial measures for agriculture his rejected report recommended to the committee. He recommended the reduction of one-half of the malt-duty—t

abolition of the present corn laws, and the substitution of a fixed for a fluctuating duty—non-interference with the currency—the introduction of poor laws into Ireland—statistical information—the renewal of the grinding act—the reduction of rents—and no reliance on Parliament for relief, but on industry and good management.

The reduction of only one-half of the malt-duty would benefit the brewer and distiller more than the consumer, and the farmer less than either ;—there is no necessity for an alteration in the corn-laws, because at present the farmer enjoys ample protection from foreign competition, and that is the only benefit which any corn law can confer on the farmer ;—the currency is a subject of dispute, and is yet unsettled ;—poor-laws in Ireland would prevent neither the immigration of Irish labourers, nor the import of Irish agricultural produce into this country, and therefore could not directly at least benefit the farmer ;—the statistical information would be of no material use to him,—nor could the renewal of the grinding act in any way advantage him ;—reduction of rents would benefit him under every circumstance whether in prosperity or adversity ;—and industry and good management, like honesty, is the farmer's best policy in every condition of life. Had farmers taken the course recommended by Mr Lefevre, and not relied on Parliament for relief, rather than have followed the advice of the Marquis of Chandos and laid their peculiar grievances before Parliament and the country, we suspect that the amendment of the poor-laws, the commutation of tithes as a ground charge, and the adjustment of the county and highway rates would have attracted the attention of Parliament only through the petitions of a future generation. Thus we see that the measures by which Parliament undoubtedly could benefit the farmer,—as the amendment of the poor laws,—the commutation of tithes,—and the adjustment of county and highway rates, were not recommended by Mr Lefevre, because they had been taken up by Parliament independently of him ; and partly those measures which he does recommend,—as the reduction of the malt-duty one half,—the substitution of a fixed for a fluctuating duty in the corn-laws,—the introduction of poor-laws into Ireland,—statistical information,—and the renewal of the grinding act, would be of little use to the farmer ; and others

are beyond the power of Parliament to grant,—as reduction of rents, and dependence for relief on industry and good management. Of what use, then, to agriculture would have been Mr Lefevre's report? It was deservedly rejected.

In his peroration Mr Lefevre's own words are:—"The remedy is within the farmer's own power; industry and good management on his part, combined with a generous forbearance on the part of his landlord, will produce that result which it is in vain to seek (because it is not in their power to grant) from the Government or the Legislature" (p. 39). This advice the farmers in general should take in regard to the alterations recommended by Mr Lefevre. But being the professed friend of the English farmer, he might address to Mr Lefevre, and similar friends, the words which Job addressed to his professed friends who came to administer comfort to him, and say, "No doubt but ye are the people, and wisdom will die with you. But I have understanding as well as you: yea, who knoweth not such things as these? I am as one mocked of his neighbours. Be it indeed that I have erred, mine error remaineth with myself. If indeed ye will magnify yourselves against me, and plead against me my reproach. Behold, I cry out of wrong, but I am not heard: I cry aloud, but there is no judgment. I have heard many such things: miserable comforters are ye all."

ACCOUNT OF THE SHOW OF THE HIGHLAND AND AGRICULTURAL SOCIETY AT PERTH.

THIS great meeting took place in the Depot at Perth on Friday 7th October. The preliminary arrangements were conducted by a local committee, assisted by the Lord-Lieutenants, Vice-Lieutenants, Sheriffs, Conveners, and Committees especially named by each of the counties of Perth, Forfar, Fife, and Kinross, and the particular business of the Show was further assisted by a deputation of Directors from Edinburgh, and the Secretaries of the local Agricultural Associations connected with these counties.

There is perhaps no place so well adapted for the great shows

of the Highland Society as the Depot at Perth. Independently of its central situation to extensive breeding districts, it is peculiarly suited, by its various compartments, to accommodate in comfort and safety a very large number of every species of stock. The building was erected by Government for the confinement of French prisoners, of whom not fewer than 8000 were accommodated in it. The range of buildings consist of five wards, the faces of which look, and the subdivision-walls between which converge towards a common centre, which is occupied by a hexagonal battery and tower, commanding a fine bird's eye view of the whole buildings. The stalls and pens for the live-stock were ranged along the faces of the wards and the subdivision-walls. One ward contained the extra oxen, cows, heifers, and the sweepstakes, which were not entered for competition; the next ward contained bulls and heifers; a third oxen and cows; a fourth sheep; and the fifth horses. The pigs were arranged along the outer wall of the tower. The roots and seeds in the verandas of the large guard-houses at the entrance-gate; and the implements along the street from the entrance to the inner gate. A large gallery for ladies was erected in front of the battery wall, commanding a complete view of all the wards. The platform for the exhibition of the prize stock was placed in front of the gallery, and the gentlemen of the committee and judges were accommodated in various convenient and comfortable apartments. It will be seen, even from this imperfect sketch of the depot, that superior accommodation for the occasion could not have been obtained.

The noblemen and gentlemen forming the various committees were entertained on Thursday morning, by the Lord Provost and Magistrates of Perth, at an elegant *dejeuné à la fourchette* in the Assembly Rooms. After which the various committees held a general meeting, Lord Kinnaird in the chair, here being present Lord Stormont, preses of the deputation of directors; the Marquises of Tweeddale and Breadalbane; Lord Douglas Gordon Halyburton, M. P. for Forfarshire; Mr Oliphant of Condie, M. P. for the city of Perth; Mr Chalmers of Auldbar, M. P., and the other members of the committees. The various committees were named for conducting the duties of the meeting, such as placing the stock in the show-yard,

receiving the entry-money at the gates, attending on the judges, distributing the police, and arranging for the public dinner; and the following gentlemen were appointed judges for determining the premiums for the different classes of stock, and other subjects of competition:—

For the Short Horns, the Marquis of Tweeddale, Mr Charge, Barton, Richmond, Yorkshire; and Mr Heriot, Ladykirk, Berwickshire.—For the West Highland Breed, Mr Stewart of Auchadashinaig, Island of Mull, Argyleshire, and Mr M'Farlane, Strachurmore, Argyleshire, and Mr Campbell of Jura.—For the Ayrshire Breed, Mr Bartlemore of Seaside, Ardrossan, and Mr Wilson of Deanside, Renfrew.—For the Polled Breed, Mr Miller of Ballumbie, Mr Proctor of Glammis, and Mr Crawford of Balbogie.—For the Fife Breed, Mr Crawford, Balbogie, Mr Forsyth, Balbirnie, and Mr John Proctor, Glammis.—For the best of any breed, the same Judges as for the Short Horns.—For Horses, Mr Cossar, Dunse, and Mr Dick, veterinary surgeon, Edinburgh.—For Black-faced and Cheviot Sheep, Mr Graham of Lock-erbie, Dumfries-shire, and Mr Sellar of Westfield, Sutherlandshire.—For Leicester and Crosses with the Leicester, the same Judges as for the Short Horns.—For Swine, the same Judges as for the Short Horns.—For Extra Stock, Mr Hunt, Thornington, North Durham, Mr M'Donald, Craigruie, Mr Torrance of Kilsaintninian.—For Implements, Roots, and Seeds, &c., Mr Robison, Secretary of the Royal Society, Edinburgh; Professor Low; Mr Hunter of Thurston, East Lothian; Mr Parkes, engineer, Lancashire; Mr Oliphant of Condie; Lord Douglas Gordon Halyburton; and Mr Slight, curator of the Highland Society's models.—For Sweepstakes, Mr Watson, Keillor, and Mr Thomson, North Mains of Strathallan.

At an early hour on the day of the Show, a large committee of gentlemen were in attendance; and so perfect were all the arrangements, that the whole of the animals were in the situations allotted to them, and the Judges ready to enter upon their duties at half-past nine o'clock. The stock of all kinds brought forward in competition for the premiums amounted to 769, being 315 head more than were exhibited at the previous meeting at Perth, and of a quality very far superior.

I. CATTLE.

1. Of the *Short-horned Breed*, thirty-nine animals were entered for competition, namely, twenty-two bulls, eleven cows, three heifers, and three steers, calved after January 1834. The increase in the number of this valuable breed, is the subject of just congratulation, not only on account of the intrinsic merit of this class of stock, so much suited to the more fertile parts of the districts immediately connected with the Show, but as being calculated to improve, in a remarkable manner, the less improved of the native stock. It is not here our purpose to recommend rash and inconsiderate crossing, but there are assuredly few of the races of the lower parts of Scotland, into which an infusion of the blood of this highly cultivated breed will not be productive of important benefit. Amongst the competitors of this class of stock, we are pleased to record the names of the Duke of Buccleuch, the Earl of Hopetoun Lord Kinnaird, Lord Gray, and others, all anxious to contribute their endeav-

vours to the improvement of this part of the stock of the country. The premiums awarded were as follows:—For the class of bulls, the first premium was awarded to Mr George Reid, Ballancraeff, East-Lothian; the second to Mr Samuel Richmond, Chapelbank, Perthshire.—For the class of cows, the premium was awarded to Mr Thomas Ritchie, Bowhouse, Clackmannanshire.—For the class of heifers, the premium was awarded to Mr Barclay Allardice of Ury.—For the class of steers, calved after 1st January 1834, in lots of two, the premium was awarded to Mr Charles Hunter, Argyll, Perthshire. In this class of stock, the heifers exhibited by the Duke of Buccleuch were noticed as deserving great praise.

2. *West Highland Breed.*—It was to be anticipated that this most important of all the native breeds of Scotland, from its being the staple produce of so large a part of the country, would attract peculiar attention. The number of animals entered for competition was forty-two, of which eight were bulls, fourteen cows, four oxen, calved after 1st January 1832, two oxen, calved after 1st January 1833, nine heifers, calved after 1st January 1833, four heifers, calved after 1st January 1835. Amongst the competitors are noticed the names of some of the most distinguished breeders of Highland stock; and as a gratifying proof of the emulation excited, several of the lots travelled a distance of 250 miles to the place of exhibition. The premiums awarded for the West Highland stock were as under:—The first premium was awarded to the Marquis of Breadalbane; the second to Mr Donald Stewart, Luskintyre, Island of Harris. The bull of Mr James Stewart, Edraleschdach, near Callendar, was noticed by the judges in terms of commendation, and the honorary premium was awarded to the Marquis of Breadalbane as the breeder of the best bull in this class. The premium for cows in this class was awarded to the Marquis of Breadalbane, and the cow exhibited by Mr James Stewart was also noticed as possessing merit. For the fat oxen of this breed, calved after 1st January 1832, the premium was awarded to Mr John Wauchope of Edmonstone, and those belonging to Mr Charles Stewart of Chesthill were commended by the judges.—For the fat oxen calved after 1st January 1833, the premium was awarded to Mr Alexander Stewart of Glenlyon House.—For heifers calved after the 1st January 1833, the premium was awarded to the Marquis of Breadalbane, and for heifers calved after 1st January 1834, the premium was also awarded to the same noble Lord.—For the five oxen calved after 1st January 1834, bred by the exhibitor, the premium was awarded to Mr Charles Stewart, Chesthill.

3. *Ayrshire Breed.*—The number produced of this head being twenty in all, was much greater than we should have anticipated, evincing, however, the high favour in which its qualities for the dairy are held over Scotland. Amongst those who contributed in the largest numbers in this branch of stock, was the Earl of Mansfield. The premiums were awarded as follows:—The premium for the best bull was awarded to Sir John Muir Mackenzie of Jelvine, as also the honorary medal for being the breeder of the best bull in his class. The bulls exhibited by the Earl of Mansfield and Mr Peter, were commended by the judges as deserving of merit.—For the best cow the premium was awarded to the Earl of Mansfield, and that exhibited by Mr Lawrence New, Carmyle, Lanarkshire, was commended by the judges.—For

heifers calved after 1st January 1834, the premium was awarded to the Earl of Mansfield; and other two lots exhibited by his Lordship were commended by the judges.

4. *The Galloway, Polled Angus, and Polled Aberdeenshire Breeds*, occupy an important place in this exhibition, though the numbers brought forward on the present occasion was comparatively small. The reasons which induced the Society to class those breeds together, are detailed in a report published by the Society, explanatory of the principles according to which they proposed to frame their offers of future premiums. The principal exhibitor in this class was Mr Watson of Keillor, and it is a pleasure to us to record the high sense entertained by all breeders, of the skill and judgment with which this gentleman has proceeded in his course of improvement. Whatever difference of opinion may exist as to the expediency of extending the Polled Angus as a breed, none can exist as to the merits of Mr Watson as its great improver. In his hands this race seems to have arrived at all the perfection of form of which it is capable. The premiums most justly awarded were, for the best bull, calved after 1st January 1830, to Mr Watson, besides an honorary premium for being the breeder of the best bull in this class.—For the best and second best cows, the premiums were awarded to Mr Watson.—For fat oxen calved after 1st January 1832, the premium was awarded to Mr Watson.

5. *Fife Breed*.—The number of animals entered of the Fife Breed was six bulls, six cows, two fat oxen, and two steers, calved after 1st January 1834. Much discussion has arisen regarding a resolution of the Society not to give premiums for the direct cultivation of the Fife breed, but to give premiums to the animal so named solely as they should be in themselves good. This was founded on two positions; *first*, that although admirable animals were constantly produced in Fifeshire by the care and skill of particular breeders, yet the general character of the stock of the county is not such as to render it expedient to perpetuate it as a distinct breed; and, *secondly*, that the county of Fife was capable of producing the finest class of stock, and therefore did not require protection for its peculiar breed. But in the case of the present exhibition, a concession was justly made to the wishes of the gentlemen of the county of Fife, and a class of premiums was framed for this particular breed. The result thus far accords with the opinion expressed in the Society's Report that excellent animals may be raised by the breeders of this stock, as indeed of every other to which the necessary attention is given. The stock exhibited on the present occasion does the highest credit to the gentlemen who have brought it forward, and the premiums were awarded as follows:—For the best bull, calved after 1st January 1830, the premium was awarded to Colonel Lindsay of Balcarres. An honorary premium was awarded to Mr Thomson of Orkie, as the breeder of this bull. The bulls of Mr Thomson, Orkie Mill, and Mr David Wallace, were commended as possessing great merit.—For the best cow of the same breed the premium was awarded to Mr James B. Fernie of Kilmux; the cows belonging to the Earl of Rothes, Mr Hill of Lambo, Mr Hutchison, Kirkcaldy, and Colonel Lindsay of Balcarres, were commended as possessing great merit.—For oxen calved after the 1st January 1832, the premium was awarded to Lord Loughborough; and for those calved after 1st January 1832, the premium was awarded to Mr

Fernie of Kilmux.—For fat oxen calved after 1st January 1833, the premium was awarded to Mr David Wallace of Balgrumo, Fifeshire; and for steers calved after 1st January 1834, bred by the exhibitor, the premium was awarded to Colonel Lindsay of Balcarres.

6. *Any Breed.*—For the fat ox of any breed, pure or cross, except the short-horn, calved after 1st January 1832, the first premium was awarded to Mr Andrew Dalgairns of Ingliston, for a cross between the Angus and short-horn; and the second premium to O. Tyndal Bruce, Esq. of Falkland. The judges also noticed, in terms of commendation, another ox exhibited in this class by Mr Bruce, and an ox exhibited by Mr Fernie of Kilmux.

II. SHEEP.

1. The Sheep stock brought forward was very numerous and important. The first in order was that of the *Black-faced heath-breed*. Amongst the competitors we find the name of Mr Robertson of Broomlee, who justly occupies so high a place as the improver of this race of sheep. The premiums awarded in the black-faced breed were: For the best tups, the premium was awarded to Mr Alexander Denholm of Beatlaws, Lanarkshire.—For the best pen of five ewes, not exceeding 5 years and 7 months old, selected from a regular breeding stock of not fewer than 100, and the ewes having reared lambs to 1st July, the premium was awarded to Mr Thomas Robertson of Broomlee.—For the best pen of five gimmers under the same condition, the premium was awarded to Mr Andrew Weir, West Linburn, Ayrshire.—For the best pen of five fat wethers, under similar conditions, but not exceeding 4 years and 7 months old, the premium was awarded to Mr James Milne of Woodhill, Forfarshire.—For the best pen of fat wethers, under similar conditions, but not exceeding 5 years and 7 months old, the premium was awarded to Mr Thomas Robertson, Broomlee.

2. *Leicester Breed.*—It is with real pleasure we saw the numerous list of competitors in this important class of stock, and the valuable animals brought forward by breeders of distinction. The following premiums were awarded: For the best tups not exceeding 45 months old, the premium was awarded to Mr Watson of Keillor.—For the best pen of three ewes of any age, the premium was awarded to Mr Watson of Keillor.—For the best pen of three wethers, not exceeding 32 months old, the premium was awarded to the Earl of Mansfield.—For the best pen of gimmers, the premium was awarded to Mr Watson of Keillor.—For the best pen of wether lambs, the premium was also awarded to Mr Watson of Keillor.—For the best pen of ewe lambs, the premium was awarded by Mr Watson of Keillor.

3. *Cheviot Breed.*—We were somewhat surprised at the small comparative number of this class of stock. The premiums awarded were as under:—For the best tups, the premium was awarded to Mr William Aitchison of Menzeon, Peeblesshire.—For the best ewes, the premium was also awarded to Mr Aitchison.

4. *Cross Breeds.*—For wethers of any cross, the premium was awarded to Mr John Gardner, of North Kinkell, Perthshire.

III. HORSES.

Although the exhibition of this important Class of Stock was much less than we anticipated for the district, there were some very fine

animals amongst the stallions—several mares worthy of notice, but the fillies were of very inferior description. The premium for the best Draught Stallion was awarded to Mr Alexander Keith of Netherthirld, Aberdeenshire. The judges noticed the stallion belonging to Mr Wilson, Firthfield, Fifeshire, as being the second best. For the best breeding Mare, for Agricultural purposes, the premium was awarded to Mr Andrew Bannerman of Tulliehardine, Perthshire, and for the second best to Mr William Mackean of Lumloch, Lanarkshire. For the best Filly for Agricultural purposes, the premium was awarded to Mr Christopher Veitch of Park, Linlithgowshire.

IV. SWINE.

Amongst the class of Swine a considerable number was produced; the premiums were awarded as follows:—For the best boar, the premium was awarded to Robert Graham, Esq. of Garvock. For the best sow, the premium was awarded to Lord Lynedoch. For sows belonging to cottars who do not pay L. 15 of rent, the premium was awarded for the best to Mr William Archer of Tulliehardine Cottage. For the best pigs the premium was awarded to the Earl of Mansfield.

V. EXTRA STOCK.

A great variety was produced under this head, many of them possessing much merit. A fine cow of the North Devon breed, belonging to Lord Lynedoch, deserves to be especially noticed. This animal may be considered as nearly a perfect specimen of the pure North Devon breed. A three-year-old heifer, a cross between the short-horn and Ayrshire, the property of Mr D. Ritchie, was remarked by the Judges to be very fine, as were two three-year-old Lewis heifers, the property of the Messrs Stewart. We have to notice also a fine three-year-old heifer, the property of Mr Charles Stewart, small but handsome; a short-horn quey calf, the property of Mr Thomas G. Mackay; and an uncommonly fine Highland ox, the property of the same gentleman. The following are also referred to by the Judges in their report:—A cow, seven years old, a cross between the short-horn and the Ayrshire, the property of Mr Alexander Symons, Errol; a Guernsey cow, belonging to Mr Smythe of Methven; four two-year-old heifers, belonging to the Earl of Mansfield; a short-horn bull calf, the property of Lord Rollo; two curious oxen, supposed to be of the old Scotch breed, the property of the Hon. Fox Maule; three oxen of the Highland breed, belonging to Mr Charles Stewart; four oxen, crosses between a short-horn and a country cow, the property of Mr Dron; a very good ox of the Fife breed, belonging to Mr Fernie of Kilmux; a bull of the polled Angus breed, the property of Sir James Montgomery; and lastly, a short-horn bull, the property of the Duke of Buccleuch.—Among the Class of Extra Sep, we have to notice with the highest commendation, two splendid rams of the Southdown breed, exhibited by Mr Ellman of Beddingham, in Sussex. The Messrs Ellman are known throughout England as the great improvers of this beautiful breed; and we feel gratified that such examples of it have been introduced directly into Scotland by themselves. Mr Watson of Keillor is the chief supporter of the Southdowns in Scotland, and he produced some very fine specimens of them, derived, originally, we believe, from the stock of Mr Ellman, but now reared

410 HIGHLAND AND AGRICULTURAL SOCIETY'S SHOW AT PERTH.

and acclimated upon his own farm. The Judges remarked with approbation, three wethers, one a pure Leicester, and two crosses between the Cotswold and Leicester, the property of Lord Lynedoch; a tup of the Leicester breed, the property of Mr Handley, M.P.; a year-old tup of the Leicester breed, the property of Mr G. Weir; and lastly, two ewe lambs of the black-faced breed, the property of Miss Spence Yeaman of Murie.—Amongst the Extra Stock of Horses there was particularly observed by the Judges, a thorough bred stallion belonging to Lord Kinnaird, fitted for excellent hunters and roadsters; and a fine black filly, belonging to Mr Bannerman of Tulliebardine, was particularly admired.—Mr Dudgeon of Falkland Wood exhibited also a very promising two-year-old entire Colt, fitted for heavy draught, of the Clydesdale breed. Mr Wilson, Firthfield, exhibited a first-rate mare of the Clydesdale breed, for which also the judges recommended a medal.

VI. SWEEPSTAKES.

Various Sweepstakes of the members of the Perthshire Farming Association afterwards took place, which excited much interest amongst the competitors:—1st, For the best one-year old filly, gained by Mr William Thomson, Led-ketty. 2d, For the best two-year old filly, gained by Mr Bannerman, Tulliebardine. 3d, For a three-year old filly, gained by Mr George Ritchie at Rhynd. 4th, For the best Breeding Mare for agricultural purposes, gained by Mr William Cunningham, Goodlyburn. 5th, For the best two-year-old Colt, gained by Mr Hunter of Auchterarder. 6th, For the best Leicester Tup, gained by Mr Staines at Lynedoch. 7th, For the best pair of cross-bred Stots, gained by Mr Hunter of Auchterarder. 8th, For the best Cow-calf of the pure short-horned breed, gained by Mr Alexander Symons, Errol.

VII. WOOL.

The premiums advertised for the best samples of wool were awarded at the Wool Fair held at Perth on 12th July last. The successful competitors were, for the best combing wool, to Captain Hunter of Auchterarder. For Cheviot or short wool, to Mr John Welsh, Gleneffick, Forfarshire. For Highland wool, to Mr John Bennet, Methven Street, Perth.

VIII. BUTTER AND CHEESE.

Although no premiums were offered, various specimens of native cheese were produced, and particularly by Messrs Dickie from Stewarton, Mr Boreland from Hill House, Mr James Dunlop, and Mr James Lindsay from Kenwick, all in the county of Ayr. Lord Lynedoch also sent specimens of cheese made at Lynedoch in the manner of Leicester, and which the judges reported to be of excellent quality.

IX. IMPLEMENTS AND MACHINES.

In this class a working model of a very ingenious machine for making draining tiles, invented by the Marquis of Tweeddale, excited much attention. This machine moulds the clay into the form required, with facility, and seemed to the judges well calculated to answer the purpose intended. An honorary medal was voted to the noble Marquis—Premiums were voted to

Mr Jack for a contrivance for securing an equal flow of water from dams and reservoirs. To Mr Stewart Hepburn for a model of conical rollers, for pulverising soil. To Mr Stirling of Glenbervie, for a moveable harp or screen, for sorting gravel; and for a species of moveable wooden railway for removing turnips from wet land. The Judges farther called the attention of the Society to various useful implements: To an enlarged and improved road scraper, by Mr John Melville. To an improved hay and straw cutter, by Messrs James Slight and Co. Edinburgh, machine makers to the Society; the cutter was shewn in operation, and excited much attention. To various implements exhibited by Messrs Drummond of Stirling. To lots of draining tiles of superior workmanship and materials, of Mr Bogle of Ayr, and Mr Stirling of Glenbervie; and to Mr Crosshill's patent clod-crusher. Mr Beart of Godmanchester exhibited a patent machine for making drain tyle, which has the merit of being extremely simple both in construction and operation; and, among many others, the following may be also noticed:—A turnip and bone-dust sowing machine, for one drill, by David Barty, Meikleour; and a model of a compact family mangle, by John Ramsay, Kettins.

X. ROOTS AND SEEDS.

The first to be noticed of the subjects of competition under this head is the extensive collection produced by Messrs Lawson and Son, seedsmen of the Society. This collection, besides examples of plants suited to common cultivation, presented a number of rare objects, and particularly specimens of cones of the Himalaya Coniferae, transmitted to the Highland and Agricultural Society by the Hon. Leslie Melville. Some specimens of grain from Professor Fisher of St Petersburg were also exhibited, and a variety of roots and tubers. The Committee recommended that honourable notice be taken of the exertions of Messrs Lawson and Son on this and on all former occasions. The next exhibition to be noticed is a collection by Messrs Dickson and Turnbull of Perth. This, besides containing numerous examples of the potato and other useful plants, contained a very extensive collection of coniferous trees. The Committee recommended that an honorary premium be awarded to Messrs Dickson and Turnbull. Messrs Drummond of Stirling exhibited a collection of various vegetable productions, and amongst these a specimen of *Trifolium hybridum*, a plant which has been recently introduced to the notice of agriculturists, and is likely to admit of beneficial cultivation. The Committee recommend that an honorary premium be awarded to Messrs Drummond. Specimens of preserved Potatoes were produced by Mr Sharp, specimens of large Turnips and other plants, by the Earl of Rothes, and some very fine specimens of Cabbage by Baillie Ross of Perth. The Committee recommended that these contributions be acknowledged by a proper notice in the account of the proceedings of the Show. An extensive collection of dried specimens of Grass Seeds was produced by Mr Bishop, and an authenticated account of the produce of Potatoes cultivated by him. Mr Gorrie of Annat Grove presented an extensive collection of vegetable productions, including 12 varieties of Barley, 58 varieties of Wheat, 15 varieties Field Pease, 19 varieties of Oats, and 12 of Field Beans; several new and tall Grasses from America; 20 specimens of Aftermath, from valuable varieties of grass, The

412 HIGHLAND AND AGRICULTURAL SOCIETY'S SHOW AT PERTH.

Committee recommended that thanks be given to Mr Bishop, and that an honorary Medal be given to Mr Gorrie, with a warm expression of the Society's sense of his meritorious attention to bringing into notice varieties of useful plants.

It may not be uninteresting to mention a curious circumstance attending the decision of the premium for the best Leicester tup. The three judges had each fixed upon one as the best, and none being willing to yield his judgment, an umpire was called in to decide, and it was discovered that all the three tups belonged to Mr Watson of Keillor. If any of the decisions of the judges were calculated to dissatisfy, it was that on the five-year-old black-faced wethers, Mr Milne of Woodhill's lot being decidedly the best. Mr Handley, M. P., sent Leicester tups from Lincolnshire for competition. They were neat sheep, but the wool was thin. He will have by this time seen that Scotch stock are worth looking at.

The public dinner was held in the riding-school of the barracks, the Marquis of Breadalbane in the chair, supported by the Marquis of Tweeddale as croupier. The room is said to be one hundred and fifty feet long, forty broad, and twenty-eight

high, and it was completely filled by the one thousand one hundred and fifty-six persons who sat down to dinner. The room was neatly ornamented with cloth of various colours, and lighted with gas; but the design of the plough would have been more beautiful and appropriate had a real plough been substituted, accompanied with some smaller implements, and sheaves of the different kinds of grain.

The weather had been for some time before the show exceedingly wet and cold; and in the morning of the show the rain fell fast and thick, but fortunately by mid-day the sky cleared up and the afternoon was fine.

On Saturday, the day after the show, a sale of the stock that their owners were willing to dispose of, took place in the depot. The prices did not attain to figures worth recording. On the same day the reaping machines of Mr Smith of Deanston, and Mr Bell, were exhibited to a very numerous company in a field of oats to the southward of the depot, but neither the land nor the crop was in a favourable state for the exhibition. Mr

Smith's subsoil and deep-ploughing ploughs were also for a short time exhibited at work.

The meeting went off with great eclat ; and as this was the first meeting on the new plan, we may now safely conclude that the shows of the Society are established on a permanent footing in the country. Although we have already explained the plan on which these shows are now conducted, we may again mention that hitherto the Society itself fixed the places of meeting ; but now it is willing to hold them in any part of the country, by especial invitation, provided L. 300 be guaranteed by the inviters to assist the Society's premiums. It was for a time doubted that any district would give the Society such an invitation ; but this meeting at Perth, and the numerous invitations which have since poured in from all quarters on the Society, prove the groundlessness of the doubts. The meetings are now very properly thrown open to the competition of the whole kingdom ; and it is for the gentlemen who suggest the various kinds of premiums suitable to the district in which the meeting is to be held, to consider whether amendments cannot be introduced in them, so as to draw forth every variety and age of stock. It may have been observed that few fat short-horn oxen are exhibited at the shows. The paucity of their numbers may perhaps be accounted for from the competition of oxen having hitherto been permitted to an unlimited age, and owners of short-horns are unwilling to keep them to advanced ages. The age of competing fat oxen is now confined to four years, which may induce the exhibition of short horns, but as that class of stock is now brought to perfection at two years old, it might be advisable to try one class of them restricted to the age of two off. There is another circumstance which deserves consideration. It would be very desirable to ascertain what breed of oxen are brought soonest to maturity, and possess the most valuable points ; and there is no method of ascertaining the facts so easily and satisfactorily as the competition of the premium ox from each class ; and, in judging in this competition, let the most perfect animal obtain this second but highest of premiums irrespective of its actual size and weight. Such a competition would tend more than any other to distribute the best breed of cattle throughout the country.

RETROSPECT OF THE BRITISH AND FOREIGN CORN TRADE,
DURING THE HALF-YEAR PRECEDING NOVEMBER 1836.

By MR WILLIAM GRAY FEARNSIDE, London.

BEFORE advertig to the subject of the crops in the United Kingdom, we cannot help alluding to some interesting facts adduced before the "*British Association for the Advancement of Science*," held in Bristol at the latter end of August, regarding the produce of wheat. It is perhaps necessary to premise, that, with a rapidly augmenting population, it becomes one of the most important considerations which can occupy the attention of the British agriculturist, the means most conducive towards increasing the produce of wheat, in order to render the country independent of foreign supplies. We have more than once alluded to the superior system of husbandry practised by Scottish farmers, and the beneficial results emanating from the partial improvement in English agriculture, confident that the embryo power exists in the land to return twofold the present produce; and the farmer possessing thus the resources to meet the extended consumption, and depreciated currencies, it is incumbent on those who have the permanent welfare and interests of the farmers at heart, to take every opportunity of impressing on their minds the necessity of availing themselves of every species of improvement, likely to ensure the great desideratum of causing their ground to teem with abundance. The success which has already crowned the endeavours of several individuals, who have treated their soils on chemical principles, and the fertility which has been communicated to them by other scientific modes of treatment, are sufficiently notorious. Entertaining, therefore, these views, it is with pleasure we advert to the observations of *Mr Webb Hall*, at the late meeting held at Bristol, on the "acceleration of the growth of wheat." After pointing out the advantages which might be derived by agriculture, from the attention given by scientific men to certain subjects with which it is connected, and the absolute necessity which now exists for making the most extensive and careful investigations concerning many points of great importance

to the success of agriculture, he proceeded to call the attention of the audience to a statement of facts, by which it would be seen, that the usual period allotted to the occupation of the ground for a crop of wheat, might be very materially abridged. At an average this might be estimated at ten months, though twelve, and even thirteen, were not unusual, and eight might be considered as the shortest period for the ordinary winter wheat. By a selection of a particular seed, and a choice of peculiar situation, wheat sown early in March has been, on different occasions, ripened before the middle of August, a period scarcely exceeding five months. Mr Hall considered it an unquestionable law of vegetation, that the offspring of a plant of early maturity, itself seeks to become equally forward, even when placed in unpropitious circumstances, and that it recedes with reluctance from the condition of its parent. Hence the seed of a crop which has been ripened in five months, has a better prospect of producing another crop equally accelerated, than that from a crop which has been longer in ripening. He also asserted that the acceleration of a crop was farther promoted by thick sowing, which likewise might be considered advantageous in checking and stopping the mildew. Dr Richardson referred to the remarks of Humboldt, that in South America the wheat crop was ripened in ninety days from the period of sowing, and stated that about Hudson's Bay this period was only seventy days, and suggested the probable advantages that might arise from importing seed from the latter country, for the purpose of furthering Mr Hall's views; and as connected with the acceleration of the growth of seeds generally, Professor Henslow mentioned the results of experiments which he had tried upon seeds of a species of *Acacia*, sent by Sir John Herschel from the Cape of Good Hope, with directions that they should be steeped in *boiling water*. Some of these were kept at the boiling temperature for three, six, and fifteen minutes respectively, and had yet germinated very readily in the open ground, whilst those which had not been steeped did not vegetate. It was suggested that these facts might lead to beneficial results, by pointing out to agriculturists that they may possibly be able to steep various seeds in water, sufficiently heated to destroy certain *fungi* or insects known to be destruc-

tive to them, without injuring the vital principle in the seed itself. Mr Hope alluded to a practice common in parts of Spain, of baking corn to a certain extent, by exposing it to a temperature of 150° or upwards, for the purpose of destroying an insect by which it was attacked. Dr Yellowley gave also some account of the employment of spade husbandry on an extensive scale in the county of Norfolk. The statement contained a minute account of all the items of expenditure and return; but the experiment, though to a certain degree successful, appears to have been made under such special circumstances, that it would not warrant the deduction of any general inference. These different subjects are fraught with considerable interest, and well worthy the serious attention of the experimental farmer, a character which it is highly desirable English agriculturists should more generally assume. The rapid advance, however, of science, and the improved system of education, which the rising generation are receiving, will, it is hoped, induce them more readily to become experimentalists, as no system of geological and chemical instruction can be made generally available in all localities. It is, therefore, only by experiment, grounded on science previously inculcated, that the farmer can be enabled to render his knowledge practically subservient to his interest, as situation, temperature of district, superficial soil, substratum, and other concomitants, are all imperative considerations to be noticed in the application of abstract science.

Since the commencement of June, from which period our present retrospect of the corn trade commences, the hopes and fears, patience and judgment, of the farmers have been severely tested; it appears, however, from the advices and agricultural reports received from all parts of Europe, that our isles were not singular in suffering at that time from an extraordinary and ungenial season. Throughout France, Spain, and Portugal, the different countries bordering the Rhine, those duchies and parts of Saxony and Bohemia bordering the Elbe, as well as the opposite banks of Prussia and Mecklenburg, and the whole line of coast down the Baltic, including Holstein and the adjoining Duchy, with the Danish Islands, similar complaints were being responded regarding the cold unkindly state of the temperature. In the beginning of June the weather in England became warmer, though the chilly nights were proving highly detrimental to the growth of grain, and the absence of rain gave just grounds for alarm; on the elapse, however, of a few days, a copious mild shower having fallen, vegetation was materially refresh-

ened and invigorated, and, as far as it was in the power of weather to improve the aspect of the crops, heat and moisture combining their beneficial influence, that effect was wrought during the month; yet it was feared that the injury previously sustained was too decisive to hold forth any hopes of a full average growth of wheat. In some counties, and especially Lincolnshire, much of the land sown with wheat was ploughed up, and in other localities many plants had entirely failed, or else grown spindly from the weakened and impoverished root, and a large proportion of the fields appeared patchy and uneven; at the beginning of July, the continuance of cloudy warm weather, and alternate showers and sunshine, had caused all species of grain to make rapid progress. Wheat was generally in bloom under a combination of the most favourable circumstances, and the ears in many instances set full and large. Wheat on strong retentive soils and well cultivated fields rapidly improved, but on the light, cold lands, the plant stood thin, and was generally estimated deficient. Barley exhibited different growths, and with oats required more rain. Beans and peas were favourably reported. As the month advanced the copious showers and cloudy atmosphere promoted the growth of all vegetation, checking at the same time the premature ripening of the wheat-ear, occasioned often at this period by the forcing heat of the sun; as July, however, progressed, the rains were accompanied with strong winds and thunder storms, and the temperature became much colder; wheat on the strong lands was partially lodged, but spring corn was much invigorated by the timely fall of rain; towards the close of the month the harvest commenced, and wheat in a few favoured situations, on gravelly warm soils, fell beneath the sickle; a few patches of winter and chevalier barley were cut, and some fields of oats were mown; and thus early in the season, it was reported that the seasonable supply of moisture to the roots of the wheat plant, would cause the grain "to fill the bushel" better than could have been anticipated,—a fact which has been since proved, and one of importance, as the plumpness and filling out of the grain in the ear has been known to make a difference of one bushel in eight. The weather during the early part of August remained extremely fine, and harvest advanced rapidly; and on the 15th, about 500 quarters of new wheat, chiefly from Essex, appeared in Mark Lane, though on the 8th a single sample of new Talavera had been offered; the difference, therefore, as to time, between the harvest of 1835 and 1836 was not material, the first parcel of the new growth having been shown in Mark Lane on the 3d of August 1835, but the samples were superior to those of the current year. The accounts received during the month led to the belief that, though the new wheat yielded well, and in some instances to an unusual extent, owing to the full development of the grain and length of ears, yet the deficiency of the light gravelly and poor soils would reduce the aggregate return below an average produce, more particularly as compared with later seasons. Smut was also found to prevail to a considerable extent, and partial complaints were made of mildew in the Fens; many samples exhibited premature harvesting, having been cut too green,—a system, if hastily adopted, and without judgment and discretion as to the mature state of the kernel, is likely to prove detrimental to the quality in its return to the miller. The grain which had well ripened during this part of the month of August was housed

in excellent condition, and the plan pursued by farmers in several districts of cutting their wheat with the scythe, and employing more hands, renders them much more independent of the vicissitudes of our climate, and the quickness with which the fields are cleared astonishes the farmer who is wedded to *ancestral* customs. Towards the close of the month, and during September, the fine weather was succeeded by rain and cold, and the temperature morning and evening approached the freezing point. Though the bulk of the wheat crop had been secured in those counties principally devoted to its cultivation before the atmospherical change took place, yet in the more northern counties of England, as well as throughout Scotland and Ireland, the harvest was materially impeded, and the result rendered more precarious at this advanced period of the season. About the middle of September, however, dry warm weather again appeared in Ireland and Scotland, and the north of England; and the farmers, exerting themselves to the utmost during the sunshine, were enabled to make rapid progress in housing their corn. Towards the close the weather became again unsettled, and though the quantity of wheat outstanding was not to any material extent, yet the bulk of the barley and oats was exposed to all the inclemency of the season. Many complaints were made from markets in different parts of the kingdom, that the farmers had not only been induced prematurely to cut their wheat, but had not allowed it to arrive at maturity in the sheaf, having carted it immediately, fearful of trusting the weather; and many samples, therefore, came to hand coarse, tender, and ill-conditioned, and the quality, in all probability, in many instances irredeemably deteriorated by so hasty and injudicious a proceeding. The month of October was marked by those vicissitudes which characterize the climate of the British Isles. In the early part of the month rain and cold prevailed, preventing farmers from making any progress in securing the remainder of their crop in the more southern divisions of the kingdom, and in the northern not only seriously impeding agricultural operations, but preventing the unripe summer grain from arriving at maturity; in the middle of the month the rain partially abated, and the temperature becoming warmer, the farmers used their utmost exertions during the intervals of fine weather to cut their grain, and consequently the condition was much affected, and required kiln drying or cold winds to render it marketable, and the oats which were standing uncut were checked in their progress to maturity by the dampness of the atmosphere. As regards the crop of wheat in those counties from whence London more particularly draws its supply, it may be stated, that though there is a diminution in the amount of land sown with wheat, yet the decrease is not to the extent generally calculated upon, and less than in other counties. The straw is decidedly short in bulk, but the sheaves in thrashing have yielded a larger return than was at first expected, which is attributed to the fact that, at that critical period of the season, the blossoming of the plant, the weather which prevailed being warm and genial, with the intensity of the sun's rays partially clouded, caused the juices supplied to each grain to be full and healthy, and hence few seasons have been experienced in which there was less deficiency of corn in the ear. The produce, though below the average of the three previous years, may in these districts be ranked at a common average crop, the weight being nearly equal to that of last season, and in

some instances the quality superior, though much more infected with smut. The condition varies according to locality and mode of harvesting, and though a considerable breadth was secured before the wet, yet the condition on the aggregate is much inferior to the crop of 1835. The markets up to the present time have been scantily supplied with the finer qualities of new wheat, as farmers, owing to the precarious state of the weather in the later portions of the kingdom, particularly in Scotland and Ireland, and obtaining remunerating prices for all other kinds of agricultural produce, have had little necessity, and therefore no inclination, to bring forward their better samples at the previous uncertain range of prices, more especially as the currencies in Mark Lane during October had been kept in check by the pressure generally existing on the trade, which has been in a great measure produced by the proceedings of the Bank Directors raising the amount of interest on discount, and paralyzing for the moment all money operations. Parties interested in grain, have in consequence become extremely cautious in their purchases and speculations, preferring rather to await the result of the money market. The supplies, therefore, have been dependent on a consumption confined to its narrowest limits, millers only buying to the extent of their immediate wants, and the market unrelieved by purchases from any other channel, ruled languid; on the night, however, of the 28th of October, an extraordinary and sudden transition took place in the state of the weather in London, which had a material influence on all articles of grain, fodder, and provisions. A heavy fall of snow occurred, which lay on the ground upwards of a foot in thickness in even the environs of the metropolis, accompanied with a sharp frost, and which had been the few previous days experienced throughout England and Scotland, and in parts of Ireland. All agricultural operations were suspended, and a considerable impetus was given to the value of agricultural produce; the wet weather had prevented much land from being sown, and the apprehensions for the sake of the sowers were rendered alarming; after the 1st of November the wind veered to a milder quarter, and the effects of frost soon disappeared, and the farmer has been making slow progress with his sowing.

It may be readily conceived, that the fluctuating character of the season has had a corresponding effect on the currencies, which have risen and been depressed in almost an equal degree with the barometer, though maintaining a much higher range than at the similar period of 1835. At the close of March and beginning of April, red and white wheat attained their maximum for the first six months of the current year, Essex, Kentish, and Suffolk red being noted at 48/ to 50/, extra 52/, white 56/ to 58/, extra 60/. During June and July, the markets throughout England being kept in short supply by the farmers, who entertain a feeling in favour of higher rates, owing to the weather and appearance of the crops, the currencies remained unaltered, with a tendency to advance, which during August ensued, and quotations rose 2/ to 3/ per quarter for the finer descriptions of old wheat, owing to the inferior quality of the new samples, which came to market coarse, cold, and smutty. Throughout September this enhancement was maintained, and in October the precarious nature of the weather encouraged farmers weekly to demand higher terms, which were reluctantly acceded to; and the three last days of October, in consequence of the snow and frost previously alluded to, 2/ to 3/

per quarter more money was obtained, and in the beginning of November an additional advance of 1/ to 2/ making red wheat from Essex, Kent, and Suffolk worth 68/ to 70/, and white 68/ to 72/, extra 76/, and selected parcels from granary of both qualities held at 1/ to 2/ per quarter more money, exhibiting a difference, compared with the highest range of the first six months, of 8/ per quarter on red wheat, and 6/ per quarter on white; and taking the minimum range of last season, which was during the 7th, 14th, and 21st of September, when the top quotation of red wheat from the same counties was 37/ to 38/, and white 42/ to 44/, shews an improvement in favour of the farmer, in 1836, of 30/ to 32/ per quarter, both on red and white wheat; other articles of grain, with fodder and provisions, have participated in the advance of grain; and though the community generally may suffer, the farmer will not have now cause to complain of not receiving remunerating prices.

The excitement which pervaded the trade at the close of October and commencement of November, has originated from a combination of various circumstances, which have materially influenced the currencies of wheat, and operated on the minds of speculators. The unfavourable character of the weather enhanced the demands of holders in Mark Lane, which communicated a fresh impetus to all the country markets, especially in the north of England, where the quotations were already in an excited state, from the inclemency of the season. Liverpool, vieing with the metropolis in commercial importance, and the merchants and speculators alive to any circumstance which was likely to give a favourable turn to the trade, have entered freely into speculative purchases founded on the weather, the falling off in the receipts from Ireland, and reported deficiency of the potato crop in the northern portions of the sister island, and also parts of Scotland and England, especially in Lancashire, and have transmitted orders to London, and the neighbouring counties for the finer qualities of dry wheat. Ireland is in want of sound dry samples, either for mixture or immediate use; the millers not being enabled to manufacture the new growth without natural or artificial preparation, have been forced to pay in their own country extreme rates, red wheat being noted upwards of 40/ per barrel, and have therefore preferred importing for the present from the more favoured districts of England. But, after all, the speculation is more one of *quality* than entered into with the apprehension of immediate want of *quantity*. We would therefore infer, that the present rapid advance of 8/ to 10/ per quarter during a fortnight, and 10/, 12/, and even 16/ per quarter advance on bonded wheat, is premature, if connected with a supposed deficiency of supply for home consumption; and if arising from other causes, can be only of a temporary character, affording a good opportunity for holders to quit. For, be it remembered that the harvest of wheat is not reported deficient in Ireland, considering the breadth of land sown, and that the farmers, from the assistance of the agricultural banks, have it more in their power than they ever before possessed, of holding back their supplies until brought into condition. Scotland is also purchasing quality; and allowing that the crop is below an average, and less land sown than usual, yet we believe the stocks of old wheat are still large throughout England and in parts of Scotland; and assuming that the consumption will not continue as brisk as has of late been experienced, the pressure on the money market

having already affected the manufacturing districts, causing a diminution of work, and reduction in labour and wages, and therefore less capabilities to purchase bread at advanced rates, we are inclined to deduce the opinion, that the finer qualities are likely to maintain a higher relative value, but that the middling inferior qualities realizing lower proportionate rates, will have the effect of checking the averages from attaining a point, that, at the preventing currencies of wheat abroad, will permit the entry of foreign corn, unless the appearance of the future crops should prove unfavourable. If the season of the year were six months in advance, and the stocks known to be nearly exhausted, causes would then exist to warrant high prices and speculative enterprize; but when we have nearly the whole of the last crop in our barns and rick-yards, the markets having been principally supplied since harvest with old wheat, it appears more the result of a *distempered* than *sound* imagination to fancy that the present currencies can be maintained. Farmers, whose condition we rejoice has been improved, have not been compelled to force their produce on the market, and, through their own necessities, to depress prices against themselves; but now that the rates have run beyond their anticipations—have exceeded the maximum point which would have induced them to sell, they are likely to thrash out freely, and a large influx of wheat will be pressed on the market, and a consequent decline must ensue. We therefore firmly believe, that the speculation emanates from an anticipation of want likely to be experienced before another harvest—an anticipation, in truth, of a remote chance—from want of quality and momentary supply, and from more facility having been afforded in procuring discounts, and not from circumstances founded on facts or actual emergency. At the same time, it is to be remarked, that as we are likely to meet the ensuing harvest with exhausted stocks, we shall require a *superabundant* produce in 1837 to enable the consumption to proceed without having recourse *eventually* to foreign importation, or an order in Council to admit foreign corn at a nominal rate of duty for a specified period of time.

Annexed is a statement shewing the quantity of wheat received into the port of London, for the last seven years, from Michaelmas to Michaelmas in each year:—

Michaelmas.	English.	Scotch.	Irish.	Total.	Foreign.
1829-1830,	220,808 qrs.	12,934 qrs.	5,571 qrs.	239,313 qrs.	578,276 qrs.
1830-1831,	191,298	9,204	7,827	208,329	700,183
1831-1832,	241,058	56,751	94,264	392,073	303,929
1832-1833,	349,411	10,904	27,766	388,081	71,051
1833-1834,	387,752	12,905	17,774	418,431	39,017
1834-1835,	403,721	9,814	4,803	418,338	12,410
1835-1836,	416,972	2,184	1,075	420,228	45,134

The unsettled state of the weather at so early a period of the harvest has proved extremely injurious to the barley crop; for though in the principal counties where this species of grain is cultivated, as Norfolk and Suffolk, from a half to two-thirds was nearly secured previous to the wet setting in, yet the remainder, even in these favoured and fertile counties, and the bulk of the crop in other districts throughout England, has been subjected to

422 RETROSPECT OF THE BRITISH AND FOREIGN CORN TRADE,

the rain and cold. Though the weight is not reckoned equal to that of the past season, yet there are some fine bold samples of chevalier and common malting qualities; and in some instances the latter description has proved finer than the *fumed* chevalier, which appears this season, especially in localities, not to have maintained its marked superiority even of sample, doubt having always existed if it yielded an equal quantity of extract weight for weight, as compared with the common growth. Few seasons have been experienced in which a greater disparity in sample has prevailed: the grain ripened unevenly, and from its exposure to the rain, numerous samples are deficient in colour, coarse, and a few sprouted, though much less injury has been sustained from the latter cause than could have been anticipated, owing to the low state of the temperature during the inclement weather. The depressed currency of wheat, and more than relative value of barley in 1835, induced farmers to sow a larger breadth of land with the latter article, and though taking the growth of England, the crop has proved deficient, yet calculating the increased quantity of ground under cultivation, the gross produce may be considered a full average. The first samples which appeared in Mark Lane, did not indicate any superiority of quality, which may have been a *ruse* on the part of some growers and shippers, to enhance the prices of the finer descriptions, which appearing only at intervals, were readily caught up at high rates. We are impressed with the opinion, that the finer qualities are being still retained, and that from Norfolk and Suffolk, as the season advances, prime descriptions will make their appearance in larger quantities than is perhaps generally anticipated. Prices have set in high, say at 40/ to 43/ and 45/, which has materially checked the purchases of maltsters, more particularly as the stock of old malt in the hands of the brewers was considerable at the commencement of the season. The total exhaustion of the stocks of old barley, caused the consumption to depend entirely on the new produce, together with those parcels of foreign, which paid the prevailing duties of 13/10 and 12/4 per qr. The amount entered during the months of June, July, August, and September, did not, however, exceed 32,000 qrs. in the United Kingdom. Dry grinding sorts proving scarce, these, as well as distilling sorts, have maintained their full relative value; the distillers have been as yet the principal purchasers in Mark Lane; a fact from which it may be surmised, that as we are likely to receive a large portion of *black barley* this season, whether the distillers continuing to purchase may not have a large surplus of spirits in the spring, at the very period that supplies could be brought from the Baltic and Elbe, and being sufficiently in stock, they may withdraw from the market and throw the consumptive demand almost entirely on grinding qualities, as with a mild spring the malting season will be then drawing to a conclusion. The following are the importations of barley from England, Scotland, and Ireland, and abroad into London, for the last seven years, succeeding the respective harvests, commencing 29th September 1829, and ending the same date 1836.

Michaelmas.	English.	Scotch.	Irish.	Total.	Foreign.
1829-30,	301,611	2,403	750	304,764	39,965
30-31,	228,793	11,321	3,990	244,104	152,745
1831-32	251,632	30,496	5,792	290,920	70,694

DURING THE HALF-YEAR PRECEDING NOVEMBER 1836. 423

Michaelmas.	English.	Scotch.	Irish.	Total.	Foreign.
1832-33,	311,362	10,986	182	322,530	9,278
1833-34,	281,449	27,782	20,675	329,906	37,099
1834-35,	180,929	59,853	43,058	283,840	44,819
1835-36,	284,511	35,301	13,646	333,458	21,235

Giving a septennial average of British of 302,217 qrs.; the average from Michaelmas 1809 to 1815, being 232,606 qrs.; from 1816 to 1822, 246,120 qrs.; and from 1823 to 1829, 228,812 qrs.

Considerable orders have been sent abroad for the purchase of barley, for shipment the present year; but owing to the exhaustion of the old stocks of good quality, and the inferior condition of the new growth in the Baltic, there is every probability of the winter closing the ports, before any extensive shipments can be received. From Hamburg we may expect a few cargoes of Bohemian and Saale qualities, which have been well harvested and of kindly quality, and have been purchased on board at 24/6 to 25/6; but the amount will be inconsiderable before spring, when no doubt large quantities could be obtained, if the closing of the malting season did not give great reason to apprehend a fall in the averages, and consequent rise in the duties. Stettin, Mecklenburg, and Holstein barley is to be procured at 19/ to 20/.

The variable character of the weather in Scotland and Ireland, from whence England depends for the supply of oats, has caused much fluctuation to pervade the trade. No doubt a greater breadth of land has been sown with oats the past season throughout the united kingdom, and, in several instances, has occupied the place of wheat. In the early part of the year, the drought checked the growth of the plant, and on its coming to maturity, the unfavourable weather experienced rendered the harvesting of the oats extremely precarious, especially in the northern divisions of England; the ground not being cleared until an unusually protracted period; and the quality and condition in some cases seriously deteriorated. The crop generally is deficient in quantity in this country, a great portion in bad condition, and weathered. Even in June, the inclemency of the weather caused a speculative feeling to be entertained towards bonded oats, which advanced 1/ per quarter, Danish and Swedish realizing 12/ to 15/, Archangel 13/6, Dutch new 17/ to 18/; and a few orders were sent to Sweden, Holland, and Denmark, which were executed at 10/ to 14/, as in quality; English feed being worth 23/ to 25/; Poland and potatoes 25/ to 27/; Scotch 24/ to 27/; Irish feed 20/ to 22/; Irish potato 24/ to 26/; black 22/ to 24/; and free on board. Sales of oats were made in Ireland at 13/ to 13/6; the speculative opinion being in favour of an advance. Towards the end of June, the duty on foreign oats receded to 10/9, the average exceeding 24/; and about 18,000 quarters were entered in London for the home consumption. The trade in consequence became languid and declining, and the duties advanced to 12/3 per quarter, which precluded the inferior qualities from being entered; and the finer d^{ist}inctions were brought on the market at a considerable sacrifice. In August new oats appeared at market, and the crops at that period promising in^{ly} in land and Scotland a plentiful return, the quotations receded, and new^{ly} free on board in Ireland, were selling at 11/ to 11/9 per barrel, delivered in October, November, and December; old heavy oats being scarce, obt

12/ to 12/6. The stocks of oats in London having become light, and supplies moderate, the currencies improved, and have, with a few fluctuations, continued advancing, until a difference has arisen of 4/ on English feed qualities; 5/ to 7/ on Poland and potatoes; 4/ to 5/ on Irish; and 8/ to 7/ on Scotch samples; and though it is to be apprehended that the result of the crops in Scotland and the north-western and mountainous districts of Ireland will be disastrous, and much rendered unfit for feed, unless cut green, yet, considering the high range of prices, it is to be considered whether the quotations have not advanced more from the effects of short stocks of fine and old oats, than to any decided deficiency on the aggregate in the new crop; and the opinion is entertained that the present prices of new oats will not be maintained during the winter and spring, whatever want of the article may be experienced during the ensuing summer and autumn, as neither consumers nor traders are likely to hold stock up to prices which would admit of foreign importations. Oats, free on board in Ireland for forward delivery have advanced 2/6 to 3/ per barrel, being now held at 13/6 to 14/6 per barrel. Oats in bond have also improved, feed 4/ to 5/ per quarter, and brew 6/ to 8/; feed being noted at 18/ to 20/, and brew 23/ to 26/. During the latter half-year, a few shipments have been made to America, but the principal exports have taken place to the West Indies. About 36,000 quarters have paid a duty of 10/9 to 12/6, chiefly in London. The following account exhibits the quantity of oats imported into London from England, Scotland, and Ireland, for the last five years, from Michaelmas to Michaelmas in each year:

	English	Scotch.	Irish.	Total
1831-32,	224,506 qrs.	122,909 qrs.	628,695 qrs.	978,110 qrs.
1832-33,	199,787	149,234	581,149	930,170
1833-34,	187,392	285,482	465,742	938,616
1834-35,	76,168	285,218	764,340	1,125,726
1835-36	197,512	156,364	606,222	960,098

Prices in May, English feed,	23/ to 25/	Potato and Polands,	25/ to 27/
..... in Nov.	26/ to 30/	.....	... .. 28/ to 34/
..... in May, Scotch Angus and potato,	24/ to 27/		
..... in Nov.	30/ to 35/		
..... in May, Irish feed, 20/ to 22/	Black, 22/ to 24/	Potato, 24/ to 26/	
..... in Nov. 25/ to 27/	..... 24/ to 28/	..... 28/ to 31/	

The prices of beans having continued to advance previous to harvest, until the duties receded to 11/, large quantities of foreign were entered for consumption; but as the crop was favourably reported, a reaction ensued, and quotations receded 4/ to 5/ per quarter. The dry weather, however, proving detrimental to the podding of the new growth, and latterly the wet having been injurious to the condition, and old beans being in very limited stock, the currencies have considerably rallied, entries of foreign being made at a duty of 9/6 and 8/ per quarter. Small beans, old and new, having improved 3/ to 6/, harrow the same, and tick 3/ to 5/, during the last five months 3 quarters have been entered for home consumption throughout the

The crop of peas has been productive, and secured in good condition. Prices fluctuated before the harvest, owing to the admission of several foreign parcels, at duties of 8/ and 9/6; but owing to the scarcity of grinding barley, old oats, and fodder of all descriptions, the demand has continued brisk, and they are likely to maintain a high price all the season. The difference in their value since that time has been about 7/ per quarter on hog and grey qualities, 8/ on maple, and 4/ to 5/ on white boiling sorts; the entries of foreign have amounted to 68,500 quarters into the United Kingdom.

The unfavourable accounts received from the United States in the early part of the year as to the failure of the wheat crop, having been corroborated, and the high prices of wheat in the more southern and central departments of France, in consequence of the deficiency in the harvest, having caused a few shipments to the French ports, has kept the prices gradually advancing until, in October, they obtained a range of 8/ to 10/ above the terms demanded in June, when Danzig wheat was noted at 35/ and Baltic at 28/. The extent of business, however, was not commensurate with the orders transmitted from America, or the shipments made from England; the orders having been generally received here *in transitu*, and forwarded to the Baltic, Elbe, &c. for shipment, or else the exports have been made on owner's account. Latterly, however, the feverish state of the free market caused wheat under lock to meet more attention, and large parcels have changed hands at advanced rates, Danzig obtaining 45/ and 50/ to 56/; and lower Baltic and Hamburg red, 40/; and fine fresh, 45/ to 47/. These purchases have been made, not with the view of export, but with the intention of holding over and taking the ulterior chance for the home consumption, on the probability of which we have already expressed our opinion. Bonded flour has also met an animated demand, and the stocks of sweet cleared off; the fresh supplies from the Baltic and Elbe meeting immediate purchasers on arrival, at improving rates, for export, chiefly to the West Indies, where prices have considerably risen, especially in Jamaica, as noticed in the foreign review, owing to the falling off in the shipments from America; prices have advanced from 20/ and 23/ per barrel to 28/, 30/, and 32/ per barrel, and the demand still continuing; but from want of supply the business is consequently limited. The amount of flour exported since May has been 135,837 cwts.

In *Scotland* the prevalence of cold, frosty, ungenial nights during the month of May and early part of June, considerably endangered the vegetative powers of all growing grain; and it was even then predicted that the injury received would not be remedied by the warm weather afterwards experienced; which has been since unfortunately verified, a deficiency in wheat having ensued; and, from the backwardness of the season, and the consequently retarded period of the harvest, the quality as well as the quantity yielded of all grain has been more or less deteriorated, especially in the northern divisions of the kingdom. During July and August, though the temperature was variable, yet the crops made greater progress than could have been expected; the raw, wet, and boisterous weather of part of August, with chilling blasts from the east and north-east, was succeeded by a warm atmosphere, unclouded skies, and southerly gales, and wheat, though it had been checked in ripening, began, towards the close of August, to turn off, and reaping com-

menced in a few favoured districts of the Lowlands. Wheat was then represented, as it has since proved, coarse, thin, and irregular, having ripened unevenly, and been cut in some instances partly matured and partly green; having also in many cases been hurried from the field, the condition is much impaired; but the produce, though below an average, is not to the extent of one-fifth as vaguely reported, indeed, fractions are too often stated without a due appreciation of their extent and value. The breadth of land sown is less than last season, and the weight of the better qualities, on the average, not exceeding 62 lb., and many samples fall short of even 60 lb. The stock of old wheat at the commencement of harvest was estimated large, but all other grain quite exhausted.

Barley has been calculated, as to produce, the best crop grown this season, and a larger breadth cultivated than usual, particularly of Chevalier; but the sample exhibits considerable disparity in quality; a small portion was secured before the rain set in, and the quantity and weight good, samples appearing of 53 lb. to 55 lb.; the principal part, from its exposure to the weather, is either deficient in colour, light in weight, sprouted, or damaged by heating in the stack.

Oats have in some districts supplanted the growth of wheat, they have ripened extremely slowly, and their harvesting has been excessively tedious and expensive to the farmer. In early favourable soils they generally filled well, and have produced a bold good sample, where secured before the inclement weather; though we are fearful the quantity thus fortunately saved has not borne any large proportion to the bulk. Potato qualities weigh from 40 lb. to 44 lb.; and Angus, 39 lb. to 42 lb., where housed under propitious circumstances, but the general weights may be taken at rather a lower average. In the high moorland districts some quantity has not yet arrived at maturity, and must prove light and valueless, and some fields have been cut green for fodder. It is estimated that the produce per acre was a full average previous to the injurious effects caused by the weather; and allowing that more land was this year sown, and making a deduction for the amount not worth cutting or only fit for fodder, the produce must be estimated barely equal to a moderate average crop of former years.

The potato crop in the early part of the season had in many instances *missed*, and apprehensions were entertained for the result of the produce of this valuable esculent, which is becoming every year more indispensable to the country. Potato digging having commenced, it was discovered that partial failures existed to a serious extent, and though the return in localities is satisfactory, yet, on the aggregate, there is a decided deficiency, but it is at present difficult to define to what extent.

Beans and peas were checked in their progress in spring and early part of summer by the drought, and the rains of August causing them to make a second growth; and they have run more to stalk and haulm instead of filling in the pods, and are much below an average crop.

The prices of wheat not having been depressed to an equal extent with those in England, the advance has not been so considerable, though in other respects, in some districts, the improvement is greater. At Edinburgh the price of wheat during the last six months has not exceeded 5/ to

8/; barley 1/ to 2/; potato oats 2/; and Angus 2/, per quarter. At Glasgow, wheat is 5/ per 240 lb. dearer; barley 1/6 to 2/ per 320 lb.; oats 1/6 to 4/ per 264 lb. At Berwick, wheat has improved 5/ to 7/; barley 2/ to 4/; potato oats 2/ to 3/ per quarter; and feed 1/ to 2/. At the principal shipping ports to the northward the advances in wheat have been 7/, 11/, and 13/; barley 3/ to 5/; oats 4/ to 5/ per quarter.

In *Ireland*, during the month of June, the previous drying winds and chilly atmosphere were succeeded by a milder temperature and beneficial rains, which improved the aspect of the fields. Barley and oats were extremely backward from the want of moisture; the drought was also detrimental to the growth of flax, which was thin and stunted, and in consequence a diminution has ensued in the produce, though, from the additional quantity cultivated the past season, the return has been more than equivalent to the previous year. Wheat, as the season advanced, considerably improved; the weather during July having been extremely favourable and conducive to the progress of all grain, alternate sunshine and rain having prevailed; and wheat being sufficiently forward to derive the full benefit of the atmospheric changes, the ears filled well and the grain became plump. During September, however, the fine weather, which in August had favoured the agriculturist's hopes, was followed with rain and cold, rendering the condition of the wheat, which was housed in the course of the month, soft, and the grain unfit without kiln-drying for immediate use. In the southern, eastern, and midland counties, a good proportion of the wheat was secured in fair condition, but the remainder has been more or less deteriorated by wet, and though these divisions of the kingdom are always more advanced with their harvest than the northern and western, yet this season the difference of time was unusually extended; and as the weather continued rainy, with only a few intervals of sunshine, the crops have been more or less exposed to the inclemency of the season, and the sample consequently handles cold, tender, and out of condition. The quality, however, on the average is superior to the growth of the two former years, but slightly infected with smut. In the more southern and south-eastern counties the cultivation of wheat has been annually augmenting, but in the northern and western it is decidedly diminished, so that on the average less land has been cultivated this season than usual, but calculating the acreable produce, notwithstanding the plant was in many instances thin on the ground, yet the yield has exceeded previously formed estimations, and may be ranked a low average produce. The stocks, however, with some few exceptions in the south and south-east, were quite exhausted; and the want of old and dry new quality for mixture, has been severely felt by the millers, who have been compelled to pay exorbitant rates, say 40s. per barrel for red wheat in order to keep their mills in operation. Owing to the pecuniary accommodations afforded the farmers by the agricultural banks, they have been enabled more to control the markets, and realising remunerating prices for all their produce; provisions of all descriptions having been considerably enhanced in value. They have retained their wheats, until by natural or artificial preparation they have become a more marketable article. Before quitting the subject of British wheat, we cannot refrain from alluding

to the prevalency of smut this season, which infects the sample more or less throughout the kingdom; no blight being so injurious to the miller as smut balls, it had become a material *desideratum* in agricultural economy that some method should be adopted of cleansing the grain from this evil attendant. We have lately inspected a *Reeing Machine*, invented by Messrs Tuxford and Sons of Boston, Lincolnshire, which seems to have completely effected the object in view; the construction of the machine being as remarkable for its simplicity as it is for the efficacy of its operation. One machine with half horse power can clean *nine* quarters per hour, and as there is little friction in working, the machine is extremely durable. The cleansing properties are not confined to *smut-balls*; but *sprouted, mouldy, and perished grains, rat and mouse dirt, worms and weevils*, are removed with equal facility; and while the loss is trifling in measure, the improvement of the sample in quality is in *many instances* from 2s. to 4s. per quarter, and even more in some cases where the sample had previously been much deteriorated with much extraneous matter.

Barley has suffered much in condition from the effects of the unseasonable weather, and a great variety of sample prevails; but the quality in many instances is kindly, and gives satisfaction to the maltster, whose demands as well as those of the distiller are rapidly and annually augmenting. The breadth of land sown has rather been increased, and the produce is equal to the growth of previous years.

Oats have experienced many ordeals, but the latter, those of snow, hail and frost have been the most severe, and their consequences most destructive. The cultivation has the past season been again extended. The early sown oats on dry stiff soils suffered from the drought in May and June, and the yield has in consequence been deteriorated, but the inland and hilly districts, where sowing had not commenced so early, the growth was luxuriant; in the south of Ireland, however, and along the east coast, oats have been more favourably harvested than could have been anticipated, and are a full average produce; but on the north-west side of the island and on the mountain lands, where the article is extensively grown, a disastrous result has attended the harvest. The farmer has now to contend against all the vicissitudes to which the climate is liable, which having commenced early in the season before the plant had arrived at maturity, the securing the whole of the produce has become hopeless, much has been rendered useless, and much cut green for fodder, and where tardy ripening has occurred, the absence of solar heat has deprived the ear of a considerable portion of its nutritive quality, and the sample is thin and light. The season has therefore been so backward, that even now it is impossible to ascertain to what extent the failure in these parts of the kingdom will affect the aggregate yield; we should, however, be apprehensive that the previous promises of abundance have been reduced almost below an average return, with much disparity of quality, and though much out of condition, yet kiln-drying in this more humid climate being generally resorted to, that defect may be obviated. The free on board prices have continued to advance, and have attained the rates of 14/ to 15/6 per barrel for London.

The collateral circumstances attendant on such a precarious harvest and general exhaustion of stocks have been taken advantage of by speculators, and prices have gradually been enhanced; more particularly as great doubts are entertained as to the produce of the potato crop; a deficiency being known to exist, but how far the poorer classes will be deprived of this nutritious and valuable vegetable is not yet defined. It is however to be hoped that the threatening prospect of the season has given sufficient warning to the peasantry to adopt the strictest economy with their scanty stock, and, having exported little, they may, by a continuance of such conduct, dissipate the foreboding aspect of the future. Comparing the value of grain last November with the prices now paying, a considerable difference is observed.

	Wheat.	Barley.		Oats.	Flour.
	per Barrel.	Malting. per Barrel.	Grinding. per Barrel.	per Barrel.	per Cwt.
November 1835,	16/ to 20/	13/ to 14/6	12/ to 12/3	8/ to 9/6	11/6 to 16/
Ditto 1836,	40/ to 43/	17/ to 18/	16/ to 17/	14/ to 15/6	15/ to 26/

The continued demand in the American States for wheat and flour has had a controlling influence on the *Canadian* markets. At the opening of the navigation in spring, the first arrivals of wheat from Upper Canada realized 5/6 per minim at Montreal; Archangel quantities selling at 5/, and Baltic red at 5/3 to 5/4; the imports from England not moving off hand so readily as had been anticipated; flour, however, experienced an active demand, and fine brands brought 29/ per barrel for export. The variable weather in the early part of the year being unfavourable for the growing crops, and less wheat being sown in the protracted winter, and the continued high prices in the United States, gave gradually improved currencies. The failure in the States becoming obvious, and the extensive purchases made by American millers in Upper Canada, at 6/ to 6/3 and 6/6, a considerable impetus was given to the trade; red Hamburg wheat realizing 6/3; and at Montreal and Quebec, Upper Canada wheat being worth 7/ per minim; flour being quoted at the high range of 42/6 for fines, and 45/ superfines; at which rates the trade is now firm. The crop of wheat has turned out in the lower districts rather short of an average; but in Upper Canada it is satisfactory, and summer grain generally well reported in both divisions of the country.

The consequence of a diminution in supplies of flour from America to the *West Indies*, has thrown the demand on Europe, and considerable exports have been made to the different islands from England. Prices have risen considerably, and the last quotations in Jamaica noted German flour worth 83/4 currency per barrel; and fine American had brought 133/4 per do; the supplies to the 1st of September being upwards of 17,000 barrels less than the corresponding period of 1835.

In *New South Wales* the continued drought had rendered wheat thin and unproductive; and prices, which in December ruled at an average of 8/6, advanced after harvest to 10/ and 12/6 per bushel; though large arrivals had been received from the East Indies, Hobart Town, and Launceston; besides the arrivals expected from England. Flour was held at 30/ per 100 lb.; and maise extremely scarce and dear, say 7/ to 8/6 per bushel. As the supplies of

wheat increased, especially from Van Diemen's Land, the currencies rather receded, becoming dull at 10/ to 11/6 per bushel, and flour 28/ per 100 lb.

In *Van Diemen's Land*, the crops promising favourably by refreshing showers, prices receded to 7/ and 7/6 per bushel at *Hobart Town*, and 7/6 to 8/6 at *Launceston*, and large shipments were destined for Sydney. The wet weather endangering the quality of the grain, and the demand for New South Wales, caused the prices to advance to 9/ and 10/6; barley 5/6 to 6/6; oats 4/6 to 6/ per bushel. After harvest, on and reported large shipments from England, Calcutta, &c., the quotations gave way 1/ to 2/ per bushel; the prices being also dull and declining at Sydney. By the latest accounts, dated the middle of June, the currencies ranged from 7/ to 8/6, barley 7/ to 7/6, oats 6/ to 6/6 per bushel. Flour had receded 3/ per sack, being noted at 27/ per 100 lbs. The weather was fine, and a large extent of corn land has been sown under the most favourable circumstances.

The crop at *Swan River* was estimated at the lowest average of twelve bushels per acre, which will give 13,878 bushels, and deducting 2000 bushels for the seed the ensuing season, and computing the population at 1200, allowing 8 bushels per head per annum, there would be sufficient provision for 450½ days.

In several of the *Italian States* the crops of wheat are below, and in others, little more than an average. These facts, combined with reports of deficiency in the southern departments of France, and latterly the accounts from the United States of America, in addition to which, the advices from Genoa stating, that in Piedmont and Lombardy the crops had likewise proved deficient, Barletta wheat had in consequence advanced during the past six months 10/ to 11/, being noted at 35/ to 37/. At Ancona the inequality of the harvest, and a demand from Venice, had affected prices, which ranged at 28/ to 30/. At Trieste, large arrivals from the Black Sea, have rendered the trade dull. The appearance of the cholera in Italy, had latterly caused a partial suspension of business.

The extensive arrivals from the interior, at *Odessa* and *Tagonrog* had receded the value of wheat; hard wheat, the stocks of which were comparatively much smaller than soft, was noted at 21/ per quarter. Vessels were extremely scarce, which checked shipments. At *Odessa* the quantity of soft wheat in granary, by the latest accounts, was 267,000 quarters.

During the summer the same weather prevailed in *France* as in England; the excessive heat in the southern districts was likened to the "hot air of Senegal," and parched the grain prematurely, proving highly injurious to the late sown wheats, spring corn, and pulse. The crop of wheat is inferior in quality, much of the grain being small and shrivelled; smut also prevailing to a considerable extent. The yield in many districts is expected to be at least one-third less, and the quality not fine; and in a few fully as much as in 1835. The crop in the circle round Paris appears to have been more favoured than most other districts. At *Marseille*, *Bordeaux*, and neighbouring markets, the prices are ranging high, and exhibit a considerable difference as compared with the quotations of last year. The aggregate average on the 1st November 1835, for the section including *Marseilles*, was 14 francs (sometimes per hectolitre) 1st November 1836, 20 francs; and in the same

proportion for Bordeaux, where the currencies were ranging from 16 francs 50 cents to 18 francs in 1835, and this year from 19 francs to 22 francs 25 cents. The average prices of wheat for the whole of France in September and October of last year, was 13 francs 66 cents to 95 cents or about $31\frac{1}{3}$ to $32\frac{1}{2}$ per quarter; and this season, for the same months, they were 16 francs 1 cent to 17 francs 3 cents, or $37\frac{1}{2}$ to $39\frac{1}{6}$ per quarter. Exclusive of large shipments made from the Channel and western ports to the southern and Mediterranean markets, several parcels of foreign corn have been already received in those departments, which have been entered at Cherbourg, Lorient, or other ports in that class, and rendered free for the consumption at a very low duty, compared with the duties at the places where the wheat is most required. This unequal operation of the French corn-laws has given considerable dissatisfaction to the agriculturists, who seem determined to petition Government, either for the equitable administration of the existing code,—by not allowing a cargo of grain which has paid duty a tany specific port to be re-exported,—or for the law on this particular point to be repealed. Barley has been deteriorated in quality, and rendered less productive by the continuance of the drought. Oats, from the same cause, also are a deficient growth, and in the principal departments of produce, Normandy, Picardy, &c. have been injured by exposure to the rain and cold which were experienced at the close of the harvest.

The accounts of the *Russian* harvest are not yet sufficiently detailed to afford any opinion of the general result, with the exception of rye, which from St Petersburg is reported to have proved abundant; and being the principal article of native consumption, it is fortunate for the lower classes that the produce has yielded more plentifully than the last two seasons. Sales have been made for export to America at $18\frac{1}{6}$ per quarter; and for delivery in May June, and July, there are several purchasers at $15\frac{1}{11}$ per quarter, with one rouble advance. Kubanka wheat has rather improved owing to the advanced currencies throughout the Baltic, and was noted at $32\frac{1}{2}$ to $33\frac{1}{5}$, and for future delivery $32\frac{1}{2}$ was demanded. The stock of oats on hand was considerable; good kiln-dried quality equal to Archangel were held at $12\frac{1}{7}$, inferior qualities $9\frac{1}{10}$ to $10\frac{1}{7}$. At Riga, Courish wheat has been bought for America at $27\frac{1}{4}$ to 29/, and new qualities deliverable this season have been sold at the same rates. Russian and Courish rye has obtained $17\frac{1}{3}$. The crop of barley and oats are not reported abundant. Oats were offered at $12\frac{1}{2}$ to $12\frac{1}{10}$ per quarter. Barley $16\frac{1}{8}$ to $17\frac{1}{7}$. The prices of linseed have been ruling high throughout the year, at St Petersburg, Morschansky, and similar descriptions remained at $40\frac{1}{9}$ to $44\frac{1}{6}$; at Riga new sowing seed had arrived, and realized readily $27\frac{1}{8}$ to $29\frac{1}{4}$ and $30\frac{1}{2}$ per barrel.

At *Danzig*, in June, the accounts received from England and France of the unfavourable weather, induced a speculative feeling, more, however, from the anticipation of evil, than actual results. Towards the close of July, the accounts of the failure in the American crops, caused orders to be transmitted from England to this port, as the prices demanded for the better qualities of bonded wheat in England were higher than purchasers would accede to. Prices consequently advanced, and are $6\frac{1}{2}$ to $8\frac{1}{2}$ per quarter dearer than at the commencement of the past six months. The weather was variable during

harvest, but the wheats have been received in tolerably good condition from West Prussia, whence the finest samples reach Danzig. It is stated, that the new wheat, though not quite bright, is found to yield better, particularly as to weight; parcels came to hand weighing 62½ lbs. perfectly dry, with a full sound kernel. The crops on the Danzig side of Warsaw may be reckoned on an average, and of fair quality; but in the districts beyond Warsaw the yield is short, but quality good. Rye has met an active demand for shipment to America, Norway, &c.; the crop has been an average, and prices ruling from 15/9 to 16/9 and 17/6. Flour has met an active demand at advanced terms, and difficulty was experienced in contracting for spring delivery.

At *Konigsberg*, owing to an uncommonly cold spring and summer, the harvest has been much retarded. Wheat is an abundant crop, but the first cut was housed in very bad condition; favoured by the finer weather, the remainder turned out very good, the general quality equal to that of 1835, though in weight somewhat lighter. None will be in a state fit for shipment this season, unless mixed with a considerable quantity of old wheat. Large quantities of mixed and red descriptions have been purchased for Liverpool; of the latter the supplies are almost exhausted; of red mixed the stocks are smaller, but they will soon be increased by the arrivals of fresh wheat; of high mixed there are still considerable quantities, of the growth of 1832 and 1833. Rye is scarcely an ordinary crop; the quality much worse than 1835; barley and oats the same. The stock of old oats is not great. Peas are a most abundant crop, and fortunately brought in during fine weather. An abundant crop of grey peas, but not having been harvested ripe, they will be only fit for feeding. Beans a moderate crop, but out of condition; and tares inferior.

In *Holslein* the season has been very backward, and dry cutting winds prevailed almost without intermission till the middle of June. Rapeseed has proved a full crop in most of the fields that escaped being ploughed up in the autumn or spring; but there was a considerable breadth of summer seed sown, which assisted to make up the deficiency of winter seed. It may be here remarked, that the cultivation of rape-seed has, within these few years, been rapidly extending into countries where it was before unknown, and a considerable quantity is now furnished from the upper Baltic ports. The consumption of rape-oil is annually augmenting, and will doubtless continue to do so as long as the present activity prevails in the woollen manufactures of England and the Continent. France also having reduced the impost duties on seed, has become a fresh purchaser in the Baltic, and the crop the past season having been a failure, the French crushers have taken the lead in the markets. The new seed was contracted for at L. 27, 15s. to L. 29, 8s. per last, and is now sold at L. 31, 12s. The failure in the whale fishery having given some impetus to the trade.

In the *Danish Isles*, the crop of wheat has been barely an average, and the demand for the article has been chiefly on the part of the home-millers, who have entered into extensive contracts on delivery. The barley crop has turned out inferior to the produce of the last five seasons, being discoloured, stained, sprouted, and uneven in quality, and little fit for malting, the condition generally being too bad to admit of shipment without kiln-drying: the ar-

ticle, however, has met inquiry at about 18/ per quarter, exclusive of the cost of drying, which is 1/6 to 2/ per quarter more. Oats vary in quality and quantity according to locality, and the weather experienced during the harvest. Peas have suffered in condition from the wet, and are of mixed quality, and the bulk only fit for feeding. Kiln-dried flour in brisk demand.

At *Hamburg*, the Marks, Magdebourg, and Saale wheat, which have been received of the new growth, have turned out better in quality than had been anticipated. Few parcels were under 62 lb. in weight, and the colour little, if any thing, inferior to the crop of last year; the produce in the upland districts of the Elbe being computed on an average quantity. In the interior of Germany, on the Saale, &c., the crop of barley is an average, and the quality equal to that of last year. The crop of oats is represented, in parts of Wolstein and Mecklenberg, to be a failure, in others and in Denmark they are plentiful, but the quality will be various; the portion secured before the late rains is fine and weighty, but that exposed to the weather is dingy in colour and light. The growth of beans has been abundant. Peas have yielded well, but come mostly to hand in rather soft condition, but good boilers. The demand on American and British account has caused the market gradually to advance, and, since June, wheat has improved 12/ to 14/ per quarter, and an active demand prevailing. Flour has also met a brisk sale for exports, and the millers are likely to be kept constantly employed in manufacturing the article, having engaged for large quantities for future delivery—prices have considerably advanced. Saale and Bohemian barley, which has arrived in small quantities, has met ready purchasers at 24/ to 25/6 per quarter on English account; the quality being kindly, and adapted for malting. Oats in animated demand for England, and prices rapidly advanced.

In *Holland* the stocks of different kinds of grain have been diminishing for some years. The prices of wheat have fluctuated materially, and through the increased demand for America have advanced in the last six months from 25 to 30 florins per last, particularly the red Rhenish samples in bond. Most of the new white wheat turns out inferior in quality, and the generality of it not quite dry; the weight of the best from 60 lb. to 61 lb., the red 61½ lb. to 63 lb. per bushel; both the red and the white are average crops. Of oats there is a tolerably good stock of old on hand, but the new crop is not large in quantity, or good in quality. Barley is abundant, and some districts have yielded a good quality; the average weight 47½ lb. to 49½ lb. per bushel; none of the old growth remaining crop on hand. Peas have produced largely, and the quality pretty good. Beans have been housed in bad condition, and are short in quantity; and very few old on hand. With respect to flax-seed, the quantity is about equal to last year's growth; about half of it will be fit for sowing, and the quality, colour, and plumpness, satisfactory.

In the *United States* a greater failure has taken place in the wheat crop than has occurred since the state has been an exporting country. In America the shipment of flour has constituted one of the principal articles of exportation, and which amounted in 1834 to 2,000,000 barrels annually—12,000,000 dollars in value. In 1835, when the crops proved partially deficient, the quantity was reduced nearly one-half.

In 1831 the value of wheat and flour imported was only 1032 dollars, whereas in 1835 it had increased to 311,116 dollars; and at the termination of the current commercial year, which ends the 30th September, a much smaller amount of exports and larger imports will be exhibited, which is already proved in the reports from New York for the present year, compared with the last five seasons. We find, however, on reference to the exports of 1831, that that year is remarkable for the quantity of flour shipped to foreign countries, proceeding from a superabundant harvest; but during the consecutive years, at first a rapid, and then a gradual diminution had taken place, proceeding from an increased consumption, the growth not having been extended in an equal ratio, and the surplus being less considerable for exportation; and which the decrease in the cultivation of wheat in the more Southern States, owing to repeated failures, partially accounts for. It appears, from the 1st of January to the 31st October in each year, the exports from New York were, in barrels—

1831.	1832.	1833.	1834.	1835.	1836.
399,851	163,632	173,983	142,199	129,783	73,976

Assuming that at the end of October the shipment this year may be 3000 barrels more than on the 30th of September. Compared, then, with the previous, this year's export is still deficient; but not to the immense extent which calculations, founded in the year 1831, would induce the belief.

The principal falling-off in the crops has been in *Virginia, Philadelphia, Maryland, and eastern part of New York*, together with the *Southern States*; but in the *other divisions of New York, in Ohio, Michigan, Tennessee, Illinois, Vermont, and Kentucky*, the harvest is an average produce; this diminution in the crops, however, refers particularly to wheat and rye, as the crops of Indian corn, an article much used, is abundant, as well as oats, and especially buck-wheat, which, in Maryland and Pennsylvania, is reported by the latest advices to be extensive and luxuriant; "never before were such rich and numerous fields of this article seen, and such an admirable prospect of a heavy crop of this excellent grain." It appears also, that the farmer has placed his principal security in buck-wheat, against the short supply of wheat, as the failure of his wheat was known before the sowing of buck-wheat commenced. There is reason, therefore, to believe that, though the agricultural interest has experienced heavy loss in the failure of the wheat, yet the deficiency, as far as possible, will be compensated for by the luxuriant growth of Indian corn, oats, buck-wheat, potatoes, and other summer esculents. The evils and misery attendant on a short crop of wheat and rye are intimately connected with the interests and welfare of every community; but in the regions thus affected, it is a source of consolation to them, that all other products of the earth, which enter into the consumption of man or animals, promise this season to be unusually rich and abundant; but it is more in a commercial point of view that the subject attracts speculative interest. Those countries, chiefly South America and the West Indies, which have hitherto been entirely dependent on the exports of flour from the United States, will in great measure be obliged to draw their supplies from Europe, at the same time that many of the American merchants, who have been accustomed

annually to enter into heavy contracts for the delivery of flour, will require large supplies of wheat or flour to meet their contracts, and which is the cause now operating on the markets in forcing the currencies to the high range at present maintained of 9 to 10 dollars, or 40/6 to 45/ per barrel for flour, and 1 dollar 90 cents to 2 dollars, and 2 dollars 20 cents per bushel, or 62/8 to 73/4 and 80/8 per quarter for wheat. The various shipments, however, which are being and have been made from the Baltic, Elbe, Weser, Holland, Belgium, England, Mediterranean, &c. of wheat and rye, are likely soon to depress the trade, though the scarcity of American vessels is the main obstacle in preventing much larger supplies from being directed to the same destination. The shipments consist for the most part of the better quality of wheat, as being the more merchantable article, where the quality of the new growth is generally inferior. Extensive shipments have been made of rye from Belgium, Holland, the Baltic and Black Seas, prices ranging from 41/9 to 43/4 and 45/10 per quarter.

MISCELLANEOUS NOTICES.

I. *New Agricultural Plants*.—We have the gratification of introducing some new varieties of field plants to the notice of our readers. They are :—

1st, *Hickling's Prolific Wheat*.—Mr Samuel Hickling, Cawston near Aylsham in Norfolk, observed, in 1830, three heads of wheat remarkable from the rest, apparently from one root, which he plucked and rubbed out, and found to contain 293 kernels. Having preserved and sown them and their produce for four successive years, the seed in the fourth year covered eighteen acres of ground, and the return was 6½ quarters per imperial acre. Hence the name Hickling's Prolific Wheat. The properties of this wheat are—straw long, stout at the bottom, and tapering to the head; head short, thick, close, and heavy; kernels four in the row across the ear, and red in colour, with the chaff white; in sample, the wheat is short, plump, thin-skinned, and looks as if it would flour well; colour dark orange-red. It has been tried for two seasons in Scotland, and if it approaches any thing near to what we have heard stated of its produce, namely 9 quarters per Scotch acre, it well deserves the appellation of *prolific*.

2d, *Whittington's Wheat*.—This variety was introduced by Mr Whittington, Whitmore House, near Ripley, Surrey. This is a very different wheat from the one just described. The straw is long and very strong like a reed; the head long, and strong, the capsules being so far set apart as to permit the spike to be seen; in sample, the grain is longish, inclined to flintiness, thin skinned, yellowish-white colour, and appears to flour well, the produce is estimated at five quarters per imperial acre. This is evidently the same wheat as that which passes by the name of *Wellington*.

3d, *Smoothey's, or Boishall New Red Wheat*.—This variety was discovered by Mr Thomas Smoothey, Boishall, near Halsted, Essex. It is a decidedly red wheat both in grain and straw. The straw is fine; ears short, thick, and close

set. The sample which we have seen of it not having filled this season, and having been raised under very unfavourable circumstances, disables us from describing the grain correctly. The produce has been rated as high as seven quarters per imperial bushel.

4th, Waterloo Red Wheat.—This variety was raised at Wickham, in Suffolk, but we have not learned the name of the discoverer. The straw is both long, strong, and stiff; heads are equally so; in sample the grain is longish, round, thin skinned, appears to flour well, and of light orange-red colour. Of its prolificacy we have heard no statement.

5th, Cumberland Early Oat.—So named from being raised by a gentleman in Cumberland a few years ago, from a single head. In sample it is a longish grain, and more like the early Angus variety than the potato; colour dark, and dull. It is as much earlier than the potato oat, as the latter is earlier than the Hopetoun, being nearly a fortnight earlier than the Hopetoun. Of a trial this year of this oat with the potato and Hopetoun on two ridges each, in the same field, on the farm of Hawkhill, Mr Thomas Chrisp found the differences between them to be these :—Produce potato oats, 17 bolls 5 bushels; Hopetoun, 17 bolls 4 bushels; early Cumberland, 24 bolls; but the potato oat weighed a stone per boll more than each of the other two.

6th, Orange, Red, and White Globe Mangel Wurzel.—The globe shape of these varieties of this root are better suited to shallow soils, the ordinary nature of arable land, than the long red variety. They may be planted 18 inches apart in the row, and 30 inches between the rows; and they yield as heavy a crop as the long red. The orange and red varieties are heavier than the white, but the white is the hardier root.—EDITOR Q. J. A.

II. *On Tanks for Water.*—By Mr J. Starr, East Bourn, Sussex.—The fourth anniversary of the Royal Polytechnic Society of Cornwall was attended by several Professors and scientific men, who, after examination of the Prize Models, expressed their admiration of the practical application by operative miners in this remote portion of the empire, of those scientific principles on which it was their department at our Universities to Lecture. But as the success of the machinery for draining the mines sometimes deprived both men and cattle of that supply of good water which contributes to health and comfort—it was suggested this might be remedied by tanks similar to mine which had been eminently useful during the last three dry summers on the property of the President of the Society in Sussex, and as they are cheaply and easily constructed, and not liable to decay like wooden vessels, and as rain enough falls on every house in England for the use of its inhabitants, no family would be deficient in good soft water, who made a tank to retain it, and such tanks, being paved over, take up no room.

The sizes at East Bourn vary; one of less than seven feet deep and wide has served two labourers' families for three years, while most of the springs in the neighbourhood were dry.

A tank twelve feet by seven feet has been found sufficient to supply with water a large family and six horses; this was surrounded by only four-and-half inch brick work resting solid against the sides, in consequence of being like a decanter smaller at the bottom than higher up, and the dome is constructed on the Egyptian plan by projecting horizontally each row of mate-

rials one-third of their length beyond those below, by filling up the back with earth as it proceeded, to balance the weight of this projecting masonry.

At the East Bourn workhouse for 14 parishes, a tank has been made 23 feet deep by 11 wide of the roughest materials, being only flint stones, and though they require more mortar than if they had been regularly shaped, only 90 bushels of lime were allowed, including two coats of plaster, and the workmanship is executed like field walls at 10s. per 100 square feet, the only essential being that no clay be used (which worms in time bore through) and that the lime or Parker's cement be good.

A current of air is said to promote the purity of water in tanks, which is easily effected by the earthen-ware or other pipe which conveys the water from the roof being of 6 or 8 inches in diameter, and an opening left for the surplus water to run away, and where the prevailing winds do not blow soot and leaves on the house, the water remains good, even for drinking, without clearing out the rubbish more than once a-year; but in some cases filtering by ascension may be found useful, and effected by the water being delivered by the pipe at the bottom of a cask or other vessel from which it cannot escape till it has risen through the holes in a board covered with pebbles, sand, or powdered charcoal.

Upwards of 20 labourers' gardens have been watered by the rain which formerly injured the public road, and was therefore turned into a sink-well, which sink-well, enlarged and surrounded by nine inch masonry drawn up by a *cast-iron curb*—was used in planting potatoes, and occasioned good crops in 1835, when sets not watered failed. And should the profitable mode of *stall-feeding*, now practising at Armagh, be happily extended to Cornwall, and fattening oxen kept in *pairs 'not tied up' under shelter*, it will be found that preserving in tanks the water which falls on the barns and stalls will amply supply them, whilst it saves the rain washing away the strength of the manure in the open yard.

Ponds have been made with equal success, dug four-and-half feet only below the surface, what is excavated being added to the sides covered, and about one foot thick, like a road with pebbles and good lime mortar. Such ponds are become general on the dry soil of the South Downs for watering the large flocks of sheep—and had such ponds been found in Romney Marsh, &c. during the last dry years, the sheep would not have died in such numbers as materially to raise the price of meat in London, and would have raised it much higher, had not the large premiums given for many years by the Agricultural Society of Scotland enabled North Britain to supply a great proportion of the sheep, as well as oxen and oats consumed in London.—*Cornwall Royal Gazette*.

III. *Meeting of Potato Dealers at Perth*.—A meeting of the farmers and potato dealers of Perthshire was held on the 8th October, for taking into consideration the attempts making by some potato dealers in London, to alter the established regulation of selling potatoes by the imperial standard-weight of twenty hundred weight to the ton, at which the following resolutions were agreed to :—

“ 1st, That this meeting are convinced, that the act establishing uniformity of weights and measures is highly beneficial in commercial transactions; and that,

as the potatoes sent to the London market are riddled, and put into a proper marketable state, before being sold to the retailers, there is no good reason why there should be a different standard-weight for the sale of potatoes, from that used for other commodities.

" 2d, That the reasons stated by the London retail potato-dealers, in their circular of the 1st of September last, for re-establishing what they call the custom and usage of the trade, appear to this meeting altogether frivolous and inconclusive; for if, as they state, the waste in preparing potatoes for sale to the public varies so much as from one-tenth to one-fifth, it is obvious that no fixed allowance of additional weight could be a fair compensation. The state and quality of the potatoes are, no doubt, attended to by retailers in fixing the price at the time they make their purchases; and, therefore, no compensation is necessary.

" 3d, That the idea of the retailers, that because the potatoes, after being washed, are deficient of weight, therefore the salesmen are liable to an action for making up this deficiency, seems grossly erroneous. As well might it be supposed, that when a miller, who purchases corn in the market, and afterwards subjects it to an additional process of cleaning, finds it deficient in quantity, he should have recourse against the seller for making up the original measure. The potatoes are weighed by meters appointed by authority; but neither they nor the salesmen can be liable for more than the standard weight of the article, in the state in which it was sold and delivered to the purchaser.

" 4th, That the threat of the retailers, of enforcing their demand, is futile and vain. They have not a monopoly of the trade; and others will be found to buy in the established weights of the country. And this meeting resolve that they will consign potatoes to no salesmen who shall sell by any other weight than the imperial nett ton.

" 5th, That these resolutions, after being subscribed by such farmers and potato-dealers as approve thereof, and have opportunity, shall be printed, and copies thereof sent to London, for circulation among the potato salesmen and retailers."

IV. *Novel and Important Use of Ammonia or Brine.*—The thanks of the Society of Arts were lately voted to a Mr Webster of Ipswich, for a statement of the effect produced on potatoes by immersion in ammoniacal water, or in brine. If potatoes are immersed for four or five days in ammoniated water, containing an ounce of the common liquor ammoniac to a pint of water, they will, on removal, be found to have their vegetative principle greatly checked, or altogether destroyed, so that they may be preserved throughout the year without the least deterioration of their general qualities. The temporary action of the ammonia in no way affects the potato beyond that of destroying its power of growth; if, however, any change is produced, it is rather beneficial than otherwise, somewhat improving the appearance and flavour of inferior potatoes, and giving them a mealiness they did not possess. The transient nature of the application removes any suspicion of injury from the material employed, and it is all lost by evaporation, so that not a trace remains behind; nor could the most fastidious ever detect that the potatoes had been immersed in ammonia, so volatile is its nature, so perfect its escape.

The exportation of potatoes to foreign climates, chiefly within the tropics, is an object of importance; and for the comfort of sailors there is nothing in the way of diet greater than the luxury of a potato with their salt food. As a means of prolonging their enjoyments, and adding to the healthful diet of a sea life, this mode may be adopted with advantage. The expense of immersion is very trifling, and they subsequently require to be spread in an airy situation to dry. Potatoes so treated have been used after ten months' keeping in a warm kitchen closet, and were found to be perfectly good. If the potatoes, instead of being removed in five days, are continued in the ammoniacal water for three weeks, the potato becomes tough and shrivelled while in the liquor, and, when dried by exposure to the air, assumes quite a new form; it appears consolidated, and its qualities are greatly lost, for on boiling it assumes the appearance of sago, or starch, yet still firm, and retaining its form; if used in its dry and uncooked state, it has a mealy flavour, and the properties of corn. There is no chemical change effected on the potato, but merely a mechanical consolidation and extraction of moisture; for precisely the same effect may be produced by immersing potatoes in a strong solution of salt and water, taking care to remove by subsequent ablution the whole of the salt, and this requires some time, and repeated changes of water.

QUARTERLY AGRICULTURAL REPORT.

November 1836.

AFTER the long exposition of the weather and crops of the last quarter by Mr Fearnside, it is unnecessary for us to go over the same ground; but still a few remarks may be acceptable from a local knowledge of some particulars. The winter wheat on fine early soils will be good in quality, and average in quantity. All spring-sown wheats on the other hand will be quite the contrary. Barley is a gift crop on good land; in the upper districts it is light and the sample unequal, from an undue quantity of unripened grain. Oats in favourable situations are an average; otherwise a very inferior crop in quality and quantity. Potato oats have failed this year more than other varieties, which should be a lesson to farmers in high districts to cultivate the hardier kinds, such as the early Angus, more than they do. Beans are very inferior in every respect; and as to peas, they are a complete failure. Potatoes are not half a crop, and the very severe frost on the 27th October and following days must have injured them materially. Unfortunately the extent of the damage by the frost will not be known till the roots spoil in the stores. On this account we would recommend the pits to be frequently handled in mild weather during the winter, in any district where there has been the least probability of injury from the frost. Turnips are not above half

a crop; but a very large breadth has been sown this year. Early sown are pretty good; late almost useless. They are selling at exorbitant prices; and letting at 7d. per head per week for old, and 5d. for young sheep. This has been the most extraordinary harvest we remember. It commenced in favoured spots as early as the third week of August, and now when we write (23d November) corn stands uncut. In the upper districts of Lanark, Peebles, Dumfries, Inverness, Argyle, and Ayr shires, much corn still stands exposed to the weather, and people can now hardly be induced to cut it down. The scarcity of grass in the autumn caused some of the crop to be cut down green for the use of the bestial. Fat cattle and sheep are both scarce and dear, so much so, that the export trade to London by steam is almost relinquished. There will not be near the number of cattle tied up to feed as usual on account of the failure of the turnips. Oil cake has in consequence got in demand, and risen much in price. For the same reason distillery stakes have been let 2s. or 3s. per head per month dearer than last year. It has been remarked that bone-dust turnip has not succeeded this year, no doubt owing both to the wetness of the season, and the lateness of being sown. Wool is lower in price; but the great start of the corn market has arisen entirely from the attempts of speculators in foreign grain to force down the import duty; but the general average of the country is still low, and will likely continue for some time. We apprehend no scarcity of bread-corn, as there is yet much old wheat in hand.

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 10th of Oct. 1835, and 10th of Oct. 1836, shewing the Increase and Decrease on each head thereof.

	Quarters ended Oct. 10.		Increase.	Decrease.	Years ended Oct. 10.		Increase.	Decrease.
	1835.	1836.			1835.	1836.		
	£	£	£	£	£	£	£	£
Customs, ..	5,353,987	6,353,777	999,790	..	18,404,212	20,166,917	1,758,705	..
Excise, . . .	4,007,375	3,892,029	..	145,346	11,681,197	12,288,173	606,976	..
Stamps, . . .	1,071,204	1,744,741	73,537	..	6,845,224	6,799,430	291,215	..
Post-Office,	372,000	381,000	27,000	..	1,360,000	1,486,000	90,000	..
Taxes, . . .	355,120	354,887	..	20,233	3,733,927	3,670,747	..	63,280
Miscellaneous,	16,513	6,240	..	10,273	76,737	52,553	..	22,204
	11,776,199	12,700,674	1,100,327	175,852	41,801,367	44,460,829	2,746,886	87,454
Deduct Decrease,			175,852		Deduct Decrease,		87,456	
Increase on the quarter,			924,475		Increase on the year,		2,659,440	

TABLES OF PRICES, &c.

average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets :—

LONDON.							DUBLIN.						
Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.		Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Bar. 9 St.	
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	1836.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
53 7	34 2	23 11	35 6	35 10	40 3		Aug. 5.	28 6	16 2	14 2	13 6	16 4	
53 8	32 8	24 2	35 10	35 8	40 9		12.	28 4	16 0	14 0	13 4	16 3	
50 10	32 4	24 4	35 9	35 10	40 0		19.	28 6	16 2	14 4	13 2	16 4	
49 6	29 7	23 5	34 8	36 0	40 8		26.	29 6	16 6	14 3	13 4	16 4	
50 2	31 7	23 8	34 2	36 4	37 8		Sept. 2.	30 2	16 8	14 4	13 6	16 6	
50 2	30 1	24 0	32 6	36 1	39 9		9.	30 6	16 9	14 5	13 8	16 9	
50 11	30 7	23 8	32 0	35 9	39 8		16.	30 10	17 0	14 8	13 8	16 9	
52 2	34 8	24 2	32 6	36 6	39 8		23.	31 4	17 6	14 10	13 6	16 10	
51 6	37 8	25 1	32 4	37 6	40 9		30.	32 0	17 8	15 0	13 8	16 10	
50 7	37 9	25 8	33 6	38 4	39 3		Oct. 7.	32 0	17 10	15 2	13 10	17 0	
49 6	38 11	26 5	32 10	38 10	40 6		14.	33 0	17 6	15 4	13 6	17 2	
50 1	39 1	26 4	33 6	39 6	39 8		21.	32 6	17 10	15 6	14 0	17 4	
51 11	39 2	26 10	33 6	40 10	38 3		28.	32 4	17 10	15 4	14 2	17 6	
LIVERPOOL.							EDINBURGH.						
Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.		Date.	Wheat.	Barley.	Oats.	Pease.	Beans.	
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	1836.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
47 5	33 6	22 8	35 8	36 2	40 0		Aug. 3.	51 34	35 0	26 10	37 6	38 0	
48 0	32 10	22 6	34 10	35 9	41 6		10.	49 14	34 8	26 3	37 8	38 0	
46 7	32 2	22 3	35 2	36 0	39 11		17.	47 3	34 11	25 10	37 10	38 2	
47 2	28 11	22 2	34 6	36 6	41 2		24.	47 2	34 1	25 8	36 9	37 10	
46 8	27 8	21 10	34 0	36 4	41 4		31.	48 84	32 0	25 0	37 6	38 6	
46 6	29 8	21 6	32 8	35 9	41 6		Sept. 7.	51 14	33 9	25 4	38 0	39 0	
47 10	30 10	22 0	32 6	36 1	41 10		14.	52 6	29 6	26 0	39 6	40 0	
47 8	30 7	22 7	32 9	36 4	41 3		21.	51 6	31 1	25 4	39 4	40 0	
46 10	31 6	22 10	33 4	37 2	42 2		28.	52 9	31 4	27 0	46 0	47 6	
45 10	31 5	23 3	33 6	38 4	42 5		Oct. 5.	52 8	31 9	27 6	47 6	48 6	
45 10	31 2	23 5	32 8	38 10	42 1		12.	52 10	30 1	27 1	47 6	48 0	
46 10	32 3	24 9	33 4	39 8	42 10		19.	52 0	31 6	26 10	46 0	46 6	
49 5	34 0	26 0	33 10	40 10	45 0		26.	53 3	32 6	27 0	45 0	46 0	

LE shewing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th & IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN RN; the Duties payable thereon, from August to December 1836.

Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
Aggregate Average.	Duty.		Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
8 50	0 36	8 33	1 32	9 13	10 23	9 12	3 35	10 35	4 16	9 35	2 40	5 9	6 40	1 39	8 11	0	
4 40	11 37	8 32	3 32	8 13	10 23	11 23	9 12	3 35	2 35	2 16	9 35	7 39	7 11	0 40	11 39	10 11	0
0 49	8 37	8 32	6 32	7 13	10 23	11 23	9 12	3 34	1 33	10 18	3 35	5 33	4 12	6 39	10 10	11 0	
1 49	3 37	8 30	11 32	3 13	10 23	2 23	8 12	3 32	8 34	5 18	3 35	0 37	3 14	0 41	4 40	3 9	6
1 49	1 37	8 31	11 32	2 13	10 23	4 23	8 12	3 32	0 34	1 18	3 35	4 35	10 16	9 40	6 40	5 9	6
9 48	9 38	8 34	0 32	5 13	10 23	7 23	7 12	3 32	4 33	8 19	9 35	9 35	4 16	9 41	5 40	8 9	6
10 48	4 38	8 34	8 32	9 13	10 23	4 23	6 12	3 32	6 33	2 19	9 36	3 35	7 16	9 40	9 40	9 9	6
5 48	0 38	8 34	10 33	2 12	4 23	5 12	3 3	3 32	2 32	10 21	3 37	4 35	11 16	9 40	7 40	9 9	6
2 47	10 39	8 35	0 33	7 12	4 2	8 23	5 12	3 32	7 32	7 21	3 37	11 36	4 15	6 42	0 41	1 8	0
2 47	11 39	8 35	4 34	4 10	10 23	9 23	6 12	3 32	0 32	5 21	3 38	7 36	11 15	6 41	1 41	0 8	0
0 47	9 39	8 35	3 34	10 10	24 0	23 8	12 3	3 33	10 32	9 21	3 38	10 37	6 14	0 41	5 41	2 8	0
7 47	8 39	8 35	5 35	1 9	4 24	3 23	9 12	3 32	3 32	9 21	3 40	8 38	4 12	6 41	8 41	3 8	0
7 48	0 38	8 36	10 35	5 9	4 25	0 24	6 10	9 33	6 32	11 21	3 41	4 39	1 11	0 41	7 41	4 8	0

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, shewing the Q Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the upon which duties have been paid for home-consumption, during the same Month; and titles remaining in Warehouse at the close thereof: from 5th Aug. 1836 to 5th Oct. 1837;

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WA	
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.
Aug. 5. 1836.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	13,733 0	..	13,733 0	155 4	2,519 2	2,674 6	527,893 4	40,263 4
Barley, . .	6,030 3	..	6,030 3	2,768 1	..	2,768 1	32,622 4	25 1
Oats, . .	22,573 3	..	22,573 3	22,140 6	..	22,140 6	238,675 6	686 0
Rye, . .	..	..	..	..	..	..	1,467 3	..
Pease, . .	11,605 7	..	11,605 7	15,711 5	..	15,711 5	14,158 7	..
Beans, . .	9,068 3	..	9,068 3	6,000 4	..	6,000 4	61,009 2	..
Totals, .	1 0	..	63,121 0	46,845 4	2,519 2	49,364 6	806,223 2	40,954 5
Sept. 5.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	34,535 3	..	34,535 3	177 7	1,685 3	1,863 2	553,282 6	38,878 1
Barley, . .	12,965 1	..	12,965 1	10,312 1	..	10,312 1	34,922 6	25 1
Oats, . .	30,502 6	..	30,502 6	7,354 2	..	7,354 2	243,378 6	686 0
Rye, . .	3,477 0	..	3,477 0	12 3	..	12 3	4,801 0	..
Pease, . .	9,576 4	..	9,576 4	21,405 1	..	21,405 1	2,108 2	..
Beans, . .	12,060 7	..	12,060 7	10,710 7	..	10,710 7	61,518 3	..
Totals, .	103,117 5	..	103,117 5	49,572 5	1,685 3	51,658 0	902,317 7	39,280 2
Oct. 5.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . .	40,620 1	0 2	40,620 3	127 3	4,510 6	4,638 1	551,464 3	34,057 5
Barley, . .	12,060 7	..	12,060 7	9,500 6	..	9,500 6	35,736 3	25 1
Oats, . .	12,530 5	..	12,530 5	4,174 0	..	4,174 0	242,381 7	686 0
Rye, . .	1,503 1	..	1,503 1	5 5	..	5 5	2,150 3	..
Pease, . .	4,128 5	..	4,128 5	404 1	..	404 1	2,649 6	..
Beans, . .	8,478 6	..	8,478 6	24,597 0	..	24,597 0	44,670 6	..
Totals, .	79,322 1	0 2	79,322 3	39,216 7	4,510 6	43,727 5	886,008 0	34,758 6
Aug. 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . .	9,471 1 26	6,180 1 5	15,651 3 3	22 2 26	6,211 3 6	6,234 2 3	102,166 3 27	6,716 2 2
Oatmeal, .	..	..	..	..	..	..	75 1 8	..
Totals, .	9,471 1 26	6,180 1 5	15,651 3 3	22 2 26	6,211 3 6	6,234 2 3	102,242 1 7	6,716 2 2
Sept. 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . .	36,315 1 5	978 1 0	37,313 2 5	14 0 24	3,775 1 24	3,789 2 20	190,077 1 26	3,919 1 6
Oatmeal, .	361 0 14	..	361 0 14	..	..	..	75 1 8	..
Totals, .	36,316 1 19	978 1 0	37,674 2 19	14 0 24	3,775 1 24	3,789 2 20	190,142 3 6	3,919 1 6
Oct. 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . .	22,944 2 8	215 3 1	23,160 1 9	333 0 22	340 2 13	673 3 7	165,280 0 5	2,734 0 12
Oatmeal, .	7 3 1	..	7 3 1	..	..	..	79 3 20	..
Totals, .	22,952 1 9	215 3 1	23,168 0 10	333 0 22	340 2 13	673 3 7	165,000 0 3	2,734 0 15

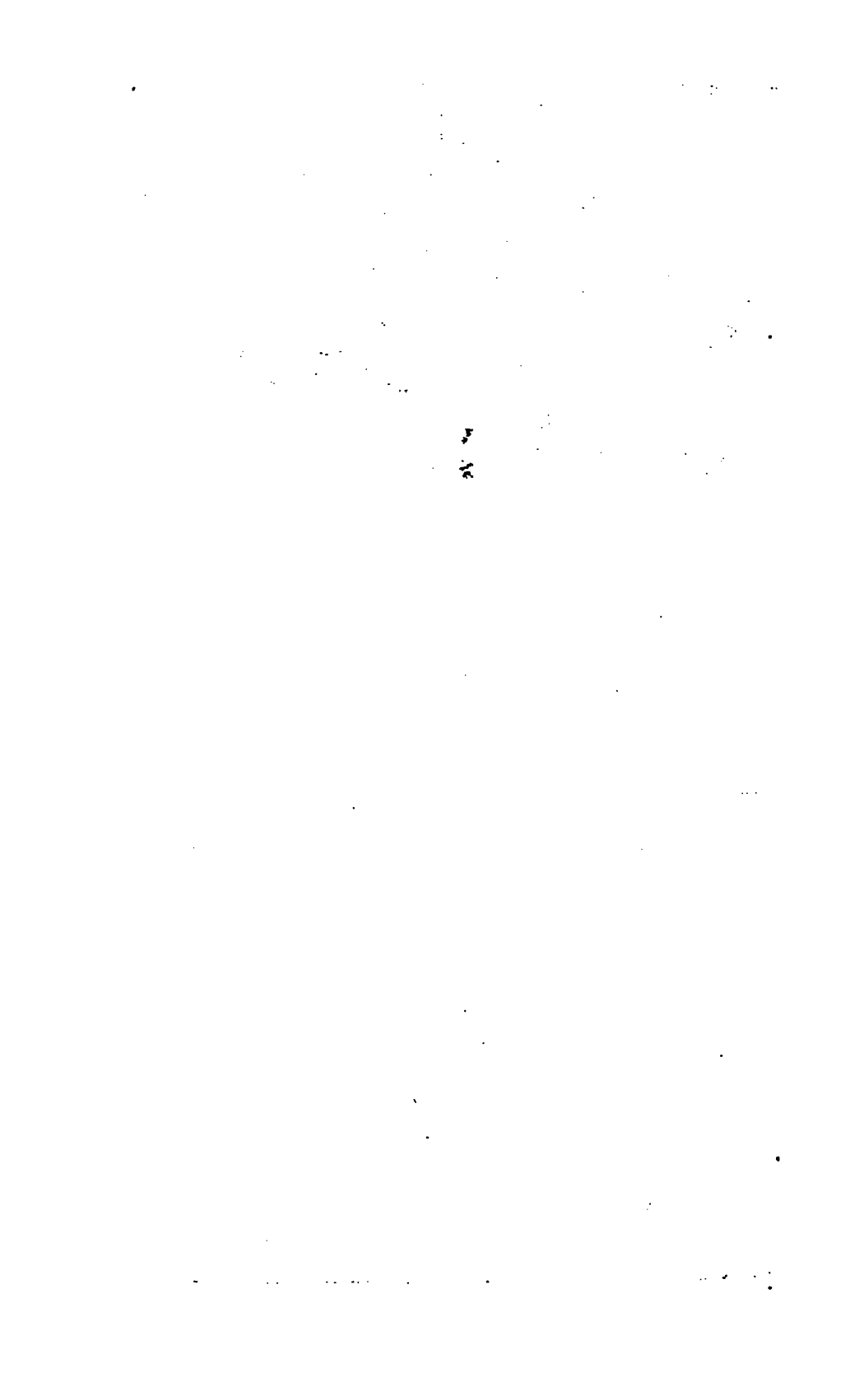
PRICES of BUTCHER-MEAT.

Date.	SMITHFIELD, Per Stone of 14 lb.		MORPETH, Per Stone of 14 lb.		EDINBURGH, Per Stone of 14 lb.		GLASGOW, Per Stone of 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1836.								
Aug.	7/ 6 @ 8/	7/ 3 @ 8/ 3	7/ @ 8/	7/ @ 8/ 3	6/ @ 7/ 3	6/ @ 7/	6/ 6 @ 7/ 6	6/ 6 @ 7/ 6
Sept.	7/ 3 8/ 3	7/ 6 8/ 6	7/ 6 8/ 6	7/ 3 8/ 3	6/ 3 7/ 3	6/ 3 7/	6/ 6 7/ 3	6/ 6 7/ 3
Oct.	7/ 6 8/ 6	7/ 9 8/ 9	7/ 9 8/ 3	7/ 6 8/ 6	6/ 6 7/ 6	6/ 6 7/ 6	6/ 6 7/ 6	6/ 6 7/ 6

PRICES of English and Scotch WOOL.

ENGLISH, per 14 lb.—Merino, 27 6 @ 31/; In Grease, 21' @ 26/;—South Down, 23/ 6 @ 25/; Lanes Hogg, 25' @ 27/; Ewe and Hogg, 22' @ 24/;—Locks, 14' @ 16/; Moor, 10' @ 13/.

SCOTCH, per 14 lb.—Leicester, Hogg, 22' @ 25 6; Ewe and Wether, 20' @ 22 4.—Ewe, 19' @ 20/; Che White, 18' @ 20/; Laid, Washed, 13' @ 15 6; Unwashed, 9' @ 9 6; Moor, White, 8' @ 9/; Laid, Wm 6 9 @ 8/; Unwashed, 6' @ 7/.

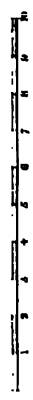






ELGIN AND NAIRN DISTRICTS.

British Miles.



41° Longitude West from Greenwich

THE
QUARTERLY
JOURNAL OF AGRICULTURE.

STUDIES IN THE SCIENCE AND PRACTICE OF AGRICULTURE, AS
CONNECTED WITH PHYSICS.

CHANCE may do much in the discovery of facts, and the invention of means, as when Mr Nutt discovered the only range of temperature at which bees swarm, and the idle boy, by tying a string to the valve of the steam-engine, invented an ingenious mode of making it work without his continual assistance. Yet it often requires much sagacity to turn to beneficial or practical account such discoveries as are made by accident or chance observation, and even men of the highest talent frequently fail in this. Dr Lister, the celebrated English naturalist, states certain facts with regard to fossil shells that would almost induce a belief of his having had more than a glimpse of some of the most important doctrines of modern geology. These facts, it does not appear that he followed up to any general induction, which was done almost a century after his time, without, it is believed, any hint having been derived from his statement. Lord Kames, in his very clever book, the "*Gentleman Farmer*," by a chance remark, most distinctly shews that he was on the very brink of anticipating the important discovery of the excrementitious discharges of plants into the soil, recently proved beyond all question by the experiments of M. Macaire of Geneva *.

Chance observations, however, though they should be of the greatest importance, are frequently lost, sometimes for want of

* Quarterly Journal of Agriculture.

being recorded, and sometimes from the observer's being incompetent to see their various bearings. Mr Nutt might have contented himself with merely announcing, in some scientific journal, his having discovered that bees will not swarm except at a particular degree of temperature, without applying it practically, as he has done, to increase the population of the hives by always preventing artificially the natural process of swarming.

Lord Kames, on the other hand, only mentions it as probable, from the analogy of animals, that plants *may* discharge something similar to excrementitious matter, without following up the idea experimentally, to prove or disprove the fact.

A more extraordinary instance may be given from the science of optics, as bearing upon practical subjects in agriculture, in a manner which could scarcely have been imagined by the most fanciful speculator. About a hundred and fifty years ago, the Dutch philosopher Huygens, in his observations on Iceland spar, discovered a remarkable property of the rays of light transmitted through it,—a property which led Sir Isaac Newton to suppose each ray to have four sides or quarters causing it to be disposed in a particular manner. Here the matter rested till it was taken up by M. Malus, whose attention was attracted to the subject by one of those rare accidents which a common observer would have passed unheeded, but which, to a master mind like his, was productive of brilliant results. In 1808, while this philosopher was viewing with a doubly-refracting prism, a fine sunset reflected from the palace of the Luxembourg, on turning the prism slowly round, he was surprised to see a very great difference in the intensity of the two images, that which was most refracted being alternately changed from brightness to obscurity at each fourth part of a turning, or as opticians would say, at each quadrant of a revolution. From that period Malus, Dr Brewster, Fresnel, Arago, Biot, and others, have discovered facts “so singular and various,” in the words of Sir J. Herschel, “that, to one who has only studied the subject of physical optics under its ordinary relations, it is like entering into a new world, so splendid as to render it one of the most delightful branches of experimental inquiry; and so fertile in the views it lays open of the constitution

of natural bodies, as to place it in the very first rank of the sciences."

Some general idea of this may be given to the unscientific reader by stating, that when a ray of light from the sun is reflected from a piece of glass, polished metal, or other such substance, it will pass freely through any transparent body, or may be reflected from another surface, even when we turn round the body. But if a ray of light be reflected from plate-glass at an angle of 57° , it is rendered altogether incapable of being reflected from the surface of another piece of glass, when turned in certain positions, though it may be reflected in other positions: and further, this ray will not pass through transparent substances turned in certain positions, though, when these are turned in other positions, it will freely pass through. Hence, it has been inferred, that the different sides of the rays of such light, as imagined by Newton, must have different properties in relation to the surface on which they are received, termed in optics the *plane of incidence*, and hence this sort of light is termed *polarized* light, on account of the sides of the rays being supposed to have, somewhat like a magnet, different *poles*. It is necessary to say, that the existence of such *sides* or *poles* is only conjectural, and not proved; but this does not in any way affect the results of the observation of facts connected with the phenomena.

One other property of this polarized light requires to be stated here. When reflected from a surface, the polarized ray is sometimes observed to go to the right, sometimes to the left, and sometimes more and sometimes less decidedly, on account of the nature of the substance used in the experiment.

Now, it is but natural for the agricultural reader, who has accompanied us thus far, to ask, What can all this minute observation and experiment on the rays of light and their polarization have to do with agriculture? Before we have done, we have no doubt that we shall most amply prove, not its mere theoretical, but its strictly practical importance; so that the reader may himself prove the correctness thereof in a very short period.

We are indebted in part for the facts to M. Biot, of the French Academy of Sciences, himself one of the most successful experi-

menters in the new science of polarization. Taking advantage of the tests afforded by substances polarizing light to the right or to the left, M. Biot instituted a series of experiments and observations for detecting the intimate constituents of certain vegetable substances, where chemical analysis failed, or at best was only imperfect or uncertain. From his researches by means of polarization, and those of M. Raspail with the microscope (another application of optics), we are now enabled to ascertain two kinds of facts of the highest importance to agriculturists, namely, *first*, What constitutes the nutritive principles of the food of animals; *secondly*, What constitutes the nutritive principles of the food of plants. The second is not yet quite so distinctly brought out as the first; but M. Biot, we are glad to learn, is continuing his researches. We shall now endeavour to give some account of the important discoveries in question.

Nutritive Principles of Animal Food contained in Grain and Roots.—Towards the end of the 17th century, the illustrious Dutch observer Leeuwenhoeck, in his microscopical researches, examined, amongst other things, portions of wheat flour, which we now know to consist of a various mixture of starch, gluten, oil, resin, sugar, and gum; and by one of those happy chances already exemplified, was led to make a shrewd conjecture respecting the real constitution of flour made from grain. In the wheat flour he found globules (*globuli farinarii*), each, as he supposed, furnished with a vessel, by which the plastic matter passes in order to produce other globules,—an optical illusion, as has since been shewn; but in subsequently studying those globules, he shrewdly asks whether they be not enclosed, as in the case of seeds, in some sort of membrane. “I then,” he adds, “used my utmost endeavours to discover the internal hidden make of the globules of meal, wherein, at length, to my great satisfaction, I succeeded.”* He describes the grains of wheat as principally composed of those minute globules which are singly transparent, and lie closely compacted within a kind of membranes, so exquisitely thin and transparent, that in some places their texture is not to be discerned. M. Biot has said, that Leeuwenhoeck observed the grain of fe-

* Hoole's Select Works of Leeuwenhoeck, p. 179.

cula (rather farina) to be composed of a vesicle and a soluble substance, which is its nutritive part, since nothing but the shells or husks are met with in the dung of animals.

Now these observations of Leeuwenhoeck were lost sight of, as that of Huygens had been relative to the polarization of light, till, eight or ten years ago, the subject was taken up by M. Raspail, apparently without being aware of what Leeuwenhoeck had published, and he has so simplified the views of the constituents of the nutritive principles contained in farinaceous substances, as to render them, when conjoined with the researches of Biot, Persoz, Pelouze, and others, of the highest interest to scientific agriculturists.

It may be remarked, in passing, that M. Raspail * endeavours to shew that Leeuwenhoeck's observations afforded not even a glimpse of his own discoveries, and that M. Biot has misunderstood or misrepresented his meaning. In the quotations from Leeuwenhoeck above, however, which we have given in Hoole's excellent translation, it will be seen that M. Raspail himself has not translated unbiassedly. Hoole was dead before Raspail's discovery. From the experiments of M. de Saussure, it was believed that he had procured the chemical basis of starch, which he termed *amedine*. This amedine may be procured by boiling starch in a large quantity of water, throwing it on a double filter; and by boiling again the matter remaining on the filter, filtering again, and drying the residue. The substance thus obtained, after repeated washings and dryings, is in irregular white, or yellowish-white fragments, very friable, and without taste or smell. M. Saussure said this formed with potass a non-viscid solution, was insoluble in water below the temperature of 140° , and did not form a jelly with boiling water. But M. Raspail shews, that what was supposed to be a solution in water at 140° , is only a suspension. Saussure failed most signally in discovering the nutritive basis of starch, which he ought to have sought for, not on the filter, but in the liquid which had passed through the filter.

Berzelius is no less in error than Saussure, when he states, as quoted by M. Raspail (*Chimie Organique*), that starch or fecula is composed of small crystals, which partly dissolve in water at

* *Chimie Organique, sub fin.*

an ordinary temperature. On the contrary, the microscope shews, that starch or fecula is composed of shining white smooth globules, quite insoluble in cold water, even when immersed for any length of time.

The globules of starch, indeed, consist of an envelope or shell and a kernel, if it may be so called, of a substance very different,—the chief discovery of M. Raspail, which serves to explain the errors and discrepancies of previous observers; for the envelope is altogether insoluble in cold as well as in boiling-water, and it is only what we shall for the present term the kernel that is at all soluble. The partial solubility, therefore, observed by Berzelius, must have arisen from the accidental rupture of some of the envelopes by which means the water could obtain admission to the kernels.

Accordingly, when Berzelius states that starch is dissolved into a mucilaginous liquid by boiling water; Thenard, that fecula combines easily with boiling-water, forming a hydrate popularly termed starch; and Despretz, that, when fecula is mixed with boiling-water, it becomes soluble, and does not recover its insolubility in cold water, when evaporated to dryness,—they all speak vaguely, and in part incorrectly, from not knowing the discovery of Raspail already mentioned. The kernel contained in the globular envelope of fecula, consists of a gum-like matter, which, by the evaporation of its watery parts, becomes hard on exposure to the air. When immersed in water at 122°, the envelope, which is unaffected by colder water, expands, and in boiling-water it bursts, while the kernel is dissolved in the water. When the water is in large quantity, the envelopes detached from their kernels, and now ten times their original size, having rec motion, subside; but when the quantity of water is small, they become mutually entangled, form jelly-like strata or layers, and render the water thick,—being what is termed starch in the laundry (*empois*).

M. Raspail, from numerous experiments, concludes, that each grain of fecula is an organized globule, formed in the interior of living vegetable cells, such as in those of a grain of wheat, or of the tuber of a potato; that the enveloping membrane of the kernel is incapable of being dissolved in cold water, spirits of wine, ether, or the acids, but expanding in proportion to the

degree of heat, and in boiling-water bursting on one side of the globule; and that after boiling in a large quantity of water, the burst and detached envelopes fall to the bottom in the form of snow-white flakes, leaving the liquid above them as limpid as water.

With respect to the kernel contained within the envelopes, M. Raspail concludes, that if the limpid liquid be cautiously poured off, the addition of spirits of wine, the concentrated acids, or tincture of galls will coagulate it, but it will not coagulate by heat; that it acquires a blue colour by adding iodine, a property it possesses in common with the envelopes, but it loses this property by being spread out thinly on a porcelain plate and dried, differing in that case in no respect from gum; and that it does not lose its characters on being dried by a moderate heat, which causes it more to resemble gum with a glass-like fracture, a splintery texture, and a shining surface.

We have M. Raspail's authority, then, for considering the kernel within the envelopes in starch as resembling gum, if not identical with it in physical and chemical characters, and hence we might be led to believe that the nutritive or soluble part is gum, or of the nature of gum. At this stage of the inquiry, however, M. Biot, along with M. Persoz, took up the subject, and succeeded so far in discovering a distinct and very remarkable difference from gum. Accordingly, on isolating the kernel portion of the parsnip root by boiling to burst the envelopes, precipitating by alcohol, purifying by repeated washings with alcohol, and then dissolving it in water in order to observe in what manner it polarized light, it was found that it turned the planes of polarization with more energy towards the right than any substance yet known; while all gums, and the sugar of grapes, turn the planes of polarization towards the left. Cane sugar, indeed, turns the planes of polarization towards the right, but not with the same energy as the kernels of starch. The latter, therefore, MM. Biot and Persoz term *dextrine*, and we shall adopt the term notwithstanding M. Raspail objects to it, till one more appropriate be proposed. The soluble portion accordingly of starch, or the farinaceous matter of grain and roots, is dextrine, which is always contained in a globular envelope, composed of membranes that are incapable of being dissolved in water even when boiling

By means of this singular and unexpected test of turning the planes of polarization towards the right of the observer, the nutritive qualities of all vegetable substances can be examined, and many of them have been so examined by M. Biot, as we shall presently see. Amongst other vegetable productions, M. Biot examined the juice of the carrot, taken from the white variety, by cold pressure. He divided this into two parts, one part being filtered through white paper without being heated; and another, after being similarly filtered, was brought for an instant to the boiling point. The result was most important in a practical point of view; the part which had been brought to a boiling temperature produced a rotation towards the right exactly double of that which had not been heated, and its absolute intensity corresponded to the proportion of four per cent. of cane-sugar, as deduced from previous observation.

"The liquor," continues M. Biot, "treated with alcohol, gave a considerable precipitate, which was instantly redissolved in water, as is the case with dextrine, and this appears to me to explain sufficiently the sudden increase of the rotation after the boiling." It will follow that even a slight boiling doubles the nutritive quality of carrots, a fact known indeed from other experiments, but only in a vague manner, without any philosophical data to explain it by.

The juice of the turnip exhibited similar phenomena. When it was procured by simple pressure and filtered through paper, the portion which passed the filter exercised no rotation that could be appreciated; but on boiling it with the pulp, a liquid was obtained, which turned the planes of polarization towards the right, indicating cane-sugar, as found in the turnip by chemical analysis.

In the juice of the beet-root, so interesting on account of the increasing manufacture of sugar from it, M. Pelouze, a young but able chemist, having found no grape-sugar, or such as is incapable of crystallization, and only cane or crystallizable sugar, M. Biot undertook experiments to investigate the subject still farther. Taking the fresh juice of the beet-root, he repeatedly measured with the greatest care the intensity of rotation which it communicated to polarized light, which he found to vary from 10° to $12^{\circ} 6'$, according to the difference of individual roots, or

different parts of the same root, indicating from 11 to 14 per cent. of cane-sugar. The crown and the sides of the root being less mature than the centre, appeared to him to be less rich in the proportion of nine to ten. As the beet-root on which the experiments were made had been taken from a field very liberally manured, the large proportion of saccharine matter, indicated by the intensity of the rotation, confirmed the remark of M. Pelouze, that the richness of the manure did not diminish the constituent quantity of sugar, though it renders it more difficult to preserve the roots. M. Biot seems to think that the large proportion of sugar might likewise be partly accounted for by the summer having been dry and hot. There did not appear to be any dextrine, for the white precipitate, perfectly soluble in water, and not coagulable by heat, did not affect the planes of polarization at all, and consequently this precipitate was neither albumen, gum, nor dextrine.

Dextrine was procured by MM. Biot and Persoz from laundry starch (*empois*) by acids cold or hot, strong or diluted, by potass, or by hot water, any one of which will rupture the envelopes, and set free the dextrine. Water alone, however, as M. Raspail proved, and MM. Biot and Persoz verified, will not completely rupture all the envelopes of fecula, or at least extract all the dextrine, unless the boiling is continued for a long time with considerable quantities of water; because the unbroken globules of fecula are apt to be held together in clots by the gum-like matter disengaged from the broken ones, and in this manner are partly protected from the full influence of the heat.

The dextrine thus obtained by any of the foregoing agents is uniformly the same, being completely decomposable by heat, while it can be analyzed into water, hydrogen, and carbonic acid gas, but no nitrogen has been found in it. When treated with yeast it undergoes the vinous fermentation, while acids change it into a saccharine syrup; but, when tried by the rotatory polarization of light, this syrup has a greater power in turning the planes towards the right than the sugar of starch in the proportion of ten to three.

Varieties in the unburst Globules.—Before the application of heat or any other agent to rupture the envelopes of the globules and set free the soluble dextrine, the globules themselves afford

interesting objects of investigation, as will appear from the following important statement of M. Raspail. He tells us, (*Chimie Organique*, 184), that in the Paris market he seldom found any wheat flour not to a certain extent mixed with potato starch, by which mixture the fraudulent dealer gains as much as 25 per cent. The potato starch has scarcely any effect on the appearance of the flour, and it requires experience and skill to detect it by the naked eye, unless the quantity of starch be considerable, when the crystalline appearance of the flour gives room for suspicion. The fraud, however, is readily detected by the microscope, and M. Raspail says he could thus discover the starch if it constituted only 1 per cent. of the flour. In examining suspected flour, it is always more easy to pronounce that it is adulterated than to tell in what the adulteration consists. The dimension and form of the globules, as given by M. Raspail, are the chief means by which such examinations can be made, and we think that no extensive dealer ought to neglect making himself thoroughly acquainted with these. He has only to furnish himself with a common microscope and a micrometer or glass plate divided by very minute lines like a foot-rule, and by laying a grain or more of flour on the micrometer, and examining it with his microscope to see how many lines it covers, he will be enabled at once to tell the quality and kind of the flour in question. Micrometers divided so as to measure the $\frac{1}{10,000}$ th part of an inch may be employed.

Potato.—The globules containing dextrine in this root acquire a larger size than any hitherto examined, being usually of from the $\frac{1}{10,000}$ th to the $\frac{4}{10,000}$ th part of an inch, or even the $\frac{4}{10,000}$ th part of an inch. When fresh they exhibit on the surface concentric wrinkles which disappear on drying. The form of these globules when large is oval; when small more spherical, the former being slightly contracted and bluntly triangular.

Wheat.—The largest globules rarely exceed the $\frac{1}{10,000}$ th part of an inch, or about half the size of the largest potato globules. They are of a round or spherical shape, and are much smaller when taken from half ripened wheat.

Barley.—The globules of barley are similar in appearance to those of wheat, but are much smaller, rarely exceeding the $\frac{1}{10,000}$ th part of an inch.

Oats.—The globules of oats are oval and yellowish; being from the $\frac{1}{100,000}$ th to the $\frac{1}{100,000}$ th of an inch in diameter. The innumerable minute hairs of this grain give the meal a sort of cottony appearance to the naked eye.

Rye.—These globules are about the $\frac{1}{100,000}$ th part of an inch in diameter, of a flat form, somewhat sharp on the edge, and marked with a black cross or three black rays forming a central star, which gives a black colour to rye flour.

Arrow-Root.—The genuine arrow-root from Brazil may be distinguished from the starch of potatoes by boiling, which only produces in arrow-root an enlargement of the globules to four times their original diameter, because, as M. Raspail thinks, they are exposed to heat in the original Brazilian preparation, while the globules of the potato expand to twenty or thirty times their original diameter. The largest globules of genuine arrow-root do not exceed the $\frac{1}{100,000}$ th part of an inch, and, like those of rye, exhibit through their translucent surface black lines like a star, or sometimes like the letter T. Potato starch is better than the genuine arrow-root.

Buckwheat.—The globules are yellow, and seldom appear so large as the $\frac{1}{100,000}$ th part of an inch.

Maize.—Few of the globules attain the size of the $\frac{1}{100,000}$ th part of an inch. The dried fecula is usually injured by grinding, being folded, wrinkled, and more or less rounded. When taken from the half ripe milky grain, they are smooth, entire, and quite round. Hence the dextrine of maize is obtained in greater proportion from the half-ripe seeds; and hence also the small proportion of starch found by the usual modes of chemical analysis, though it actually exist in the grain.

Peas.—The globules of peas are of the same form as those of the potato, with an unequal surface, and the largest are about the $\frac{1}{100,000}$ th part of an inch.

Beans.—The globules are of the same size as those of peas, but differ from being egg-oblong, or kidney-shaped, sometimes appearing as if a smaller grain were enclosed in the interior.

Other globules were examined and measured by M. Raspail, but these are the most interesting for our present purpose; and, before proceeding farther, it is indispensable to impress upon the attention of the reader,

1st, That the globules constituting meal, flour, and starch, whether contained in grain or roots, are incapable of affording any nourishment as animal food till they are broken.

2d, That no mechanical method of breaking or grinding is more than partially efficient.

3d, That the most efficient methods of breaking the globules is by heat, by fermentation, or by the chemical agency of acids or alkalies.

4th, That the dextrine, which is the kernel, as it were, of each globule, is alone soluble, and therefore alone nutritive.

5th, That the shells of the globules, when reduced to fragments by mechanism or heat, are insoluble, and therefore not nutritive.

6th, That, though the fragments of these shells are not nutritive, they are indispensable to digestion, either from their distending the stomach and bowels, or from some other cause not understood, it having been proved by experiment that concentrated nourishment, such as cane-sugar, essence of beef, or osmazome, cannot long sustain life without some mixture of coarser and less nutritive food.

7th, That the economical preparation of all food containing globules of fecula consists in perfectly breaking the shells, and rendering the dextrine contained in them soluble and digestible, while the fragments of the shells are at the same time rendered more bulky, so as the more readily to fill the stomach.

We hope these principles have been here put in intelligible and unequivocal language, so that they may not be misunderstood, seeing that they are of the very highest practical importance in preparing the food of all live-stock as well as of our own. But lest some of our readers of the old school, who are apt to reject most novelties as theoretical, should refuse to admit the truth of the deductions, it may be well to corroborate the results from actual experiments made by those who were ignorant of the very existence of the globules described by M. Raspail or the dextrine of M. Biot.

Experiments on Feeding.—Some of the most instructive experiments upon the feeding of farm-stock with different materials, were made by an intelligent foreign agriculturist, M. Mathieu de Dombasles, and published in a work little known in this country, the *Annales de Roville*. The experiments

usually made on this subject have been conducted upon the principle of continuing one species of food, such as hay or carrots, for a given time; but M. de Dombasles reflecting that it is neither natural nor agreeable to any animal to be confined for a length of time to the same species of food, adopted a different method. He separated into several groups the cattle on which he designed to experiment, and brought those in each group as nearly as possible to a given weight, by feeding them with an exactly weighed proportion of common articles of food, diversified to suit their taste. When he had proceeded so far, he then began to take away from their diversified food a known portion of one of them, such as lucern hay (*luzerne sèche*), replacing it by some sort of root, such as carrots, gradually increased or diminished, so that each individual in the group came up to and sustained the weight it had stood at before the change. The comparison of the quantities thus ascertained by trial to be equivalent, gave the practical proportions of their nutritive properties, under the conditions thus associated.

The results thus obtained by M. de Dombasles by trials with sheep, appeared to place carrots very far below the rank usually assigned to them as food for sheep by farmers on the Continent, and even as food for horses when substituted for grain. But it is important to remark, that M. de Dombasles gave the carrots in a raw state to his sheep, and consequently from their stomachs being unable in the process of digestion to cause the globules in the carrot containing the dextrine to burst, they derived little nutriment from a substance which is undoubtedly very nutritive when the dextrine is developed by boiling. The intelligent farmers in Belgium, who seem to be almost a century before other parts of Europe in improvement, never, it is said, give any roots to their live-stock without boiling.

The digestion of food is in all animals partly a chemical and partly a mechanical process, and varies much in different animals, even when they feed on similar aliment, for example, the rabbit, the horse, and the game-cock, when fed upon oats or barley. The horse and even the rabbit, when fed on oats, swallow many grains without crushing them with their teeth, and their stomachs not being endowed with the power of digesting solid uncrushed grain, it is voided whole, and so little changed

as frequently to be capable of germinating. In the case of the game-cock, again, and all gallinaceous fowls which feed on grain, it is uniformly swallowed whole, their bills not being adapted for bruising it like the teeth of the horse, nor for shelling it like the linnet and sparrows. But the gizzard of these fowls has not only sufficient power to crush oats and barley, but even, as Spallanzani proved, to reduce glass to powder; yet with all this power, so very much greater than the digestive powers of the horse, poultry cannot, as will immediately be proved, completely extract the dextrine from grain, unless assisted to do so by artificial means, besides their powers of digestion. The celebrated M. Reaumur undertook a series of experiments on raw and on boiled grain in feeding, which though made long before the discovery of dextrine, strongly corroborate the views of MM. Raspail and Biot, the more so, indeed, from M. Reaumur's non-acquaintance with the principle.

The farmers in France who keep poultry, have long been in the habit of cooking the grain given to fowls which they intend to fatten, boiling it in water till it is soft enough to be easily bruised between the fingers, the heat causing it to swell till the mealy portion of the grain splits the chaffy envelope, and this they term bursting. It is therefore the popular opinion, that boiled grain is more nutritive and fattening than raw grain, an opinion founded, however, upon vague notions, which M. Reaumur endeavoured to base upon precise calculation.

Boiling of Grain.—For this purpose M. Reaumur caused about four measures (each $1\frac{1}{2}$ pint English or $\frac{3}{4}$ ths of a chopin Scotch) of each of the six common sorts of grain, to be boiled till they were well burst, (which may be fairly taken to mean that two-thirds of the dextrine was set free), and he found that the increase of bulk in each sort was as under:—

Four measures of oats, after being boiled to bursting, filled	7 measures.
Four measures of barley, after being boiled to bursting, filled	10 ...
Four measures of buckwheat or bran, after being boiled to bursting, filled	14 ...
Four measures of maize, after being boiled to bursting, filled above	13 ...
Four measures of wheat, after being boiled to bursting, filled little more than	10 ...
Four measures of rye, after being boiled to bursting, filled nearly	15 ...

Rice swells considerably more than any of the preceding, but was not measured.

In order to ascertain whether the boiling altered the preference of poultry for any of the particular sorts, M. Reaumur made experiments, varied in every possible way. The fowls were furnished with two, three, four, five, and six different sorts, sometimes all the compartments of a feeding-box being filled with burst grain, each division different from another, and sometimes each sort of grain filled two of the divisions, one having nothing but boiled, and another nothing but dry unboiled grain.

All that could be inferred from these repeated experiments was, that the greater number of fowls prefer boiled to raw grain, though there are many of them which shew a preference to the raw grain on certain days, and no permanency could be discovered in the preference shewn for any sort of burst grain. Some fowls, for instance, which one day preferred boiled wheat, would, on other days, make choice of buckwheat or maize, oats or barley, and sometimes, though more seldom, even of rye; but rye, either boiled or raw, is their least favourite sort of grain.

It follows as an important practical conclusion from such experiments, that we may make choice of the sort of grain which happens to be cheapest to feed poultry, without much if any disadvantage, always excepting rye, when other sorts are to be had on reasonable terms.

It required experiments of a different kind to prove whether there is any economy, or the contrary, in feeding poultry with boiled grain, and this was readily ascertained by finding first how much dry grain sufficed one or more fowls, and then boiling the same quantity and trying how much of that would in like manner be sufficient. The experiments which, for this purpose, M. Reaumur made with the different sorts of grain, were as follows:—

Rye.—Although, as we have seen, rye is very considerably increased in bulk by boiling, so far from being more sufficing, it becomes less so; for fowls will eat rather more of it when it is boiled than when it is raw and dry. Seven hens and a cock, which consumed only three-fourths of a measure of dry rye in

one day, ate in the same time three measures of the boiled grain. Consequently, as three measures of boiled rye are equivalent to four-fifths of dry, it would cost one-twentieth more to feed fowls with boiled than with dry rye, four-fifths being one-twentieth more than three-fourths. The globules of rye are almost the same size, according to M. Raspail, with the globules of wheat.

Oats.—It appears, that although oats are increased by boiling nearly one-half, they are not, any more than rye, rendered more sufficing as food ; for the fowls, which, in two days, would have eaten four measures of dry oats, consumed in the same time several measures of the boiled grain. Consequently, so far as fowls are concerned, it is no saving to boil oats ; though this does not prove that the same holds with regard to horses whose powers of digestion are so inferior to those of fowls.

Buckwheat or Brank.—This grain is increased by boiling still more than oats, since four measures, when well boiled, swell to fourteen. Notwithstanding, there is little advantage obtained by boiling it for fowls, as they will consume the fourteen measures of the boiled grain nearly in the same time which the four measures of the dry grain would have sufficed them.

Maize or Indian Corn.—This grain is more profitable as food for poultry when boiled than when raw ; for the fowls, which would have eaten a measure and a quarter of dry maize, consumed only three measures of the boiled grain, and these three are not equivalent to one measure of dry maize. But it is worth remarking, that the fowls experimented upon continued only for two days able to get through three measures a-day of the boiled maize. After this time, they either lost their appetite or came to dislike the food, since they could not then eat quite two measures of the boiled grain. Now, calculating that they had continued to eat even as much as three measures of boiled maize a-day, there would be a saving of more than one-fifth ; and if they were satisfied with two measures, the advantage would be much more considerable, inasmuch as this would not be equivalent to two-thirds of a measure of the dry grain. The saving in this case would be one-third and one-fifth, that is eight-fifteenths or more than one-half.

Barley.—This grain also was found upon trial to be much more economical when given to poultry boiled than raw. Fowls,

which would have consumed two measures of the dry barley a day, got through only three measures daily of the boiled grain. Now, as ten measures of boiled barley are produced from four measures of dry, three measures are, therefore, equivalent to no more than six-fifths of a measure of dry. The expense consequently in dry barley, is to that of boiled as ten-fifths to six-fifths, that is, as ten to six or as five to three, shewing a saving of two-fifths by feeding poultry with boiled instead of dry barley. This result is, no doubt, owing to the more effectual bursting of the grains of fecula, and setting free the dextrine contained in them.

Wheat.—The results of the experiments on boiling grain, given above, shew that wheat increases in bulk about the same as barley; but the experiments made on feeding poultry were considerably different in their results, the saving not being nearly so much with boiled wheat as with boiled barley; for the same fowls, which consumed three measures of boiled barley in one day, ate three measures of boiled wheat. Now, three measures of boiled wheat are not equivalent to two measures of dry wheat, but only to a measure and a half of dry wheat, the quantity consumed in one day by the same fowls. But as a measure of boiled wheat is equivalent to no more than two-fifths of a measure of the dry grain, the three measures eaten in one day are equivalent only to six-fifths of dry wheat, and therefore the proportion of what they consumed of dry wheat was to what they consumed of the boiled, as fifteen-tenths to twelve-tenths, or as five to four; hence there is a saving of one-fifth by feeding with boiled wheat, as there is of two-fifths with boiled barley.

It is clearly proved, then, by these interesting experiments, that there is in most cases a considerable saving by feeding with boiled grain. It would be well if some intelligent gentleman would undertake similar experiments on feeding horses and cattle with boiled or steamed grain or meal. The advantage of feeding with crushed grain instead of giving it unbroken has been very satisfactorily proved and acted upon by Captain Cheyne (*Quarterly Journal of Agriculture*, iii. 1024, and iv. 378), and recommended by Mr Dick and others. The steaming of potatoes is well known to be advantageous in feeding both

horses and cows,* and more particularly in causing hens to lay, and in fattening pigs. Why should not the various sorts of grain, such as pease and beans, and meal, such as barley meal, given for similar purposes, not be advantageously increased in their nutritive properties by the same means? The expense of fuel, though it ought to be taken into the account, must be small in comparison with the advantage, at least in districts where coal or other fuel is reasonable in price. In large concerns, also, the expense of fuel would of course be proportionally less when compared with the saving in food.

Bread-making.—The most complete method hitherto discovered for bursting all the globules of fecula, is the usual process of making bread, or, as chemists term it, *panification*. This arises from the presence in wheat flour of a substance termed gluten, associated with the globules of fecula, and constituting in the unbroken grain its cellular texture or frame-work. It would lead us too far from our present object to go into the history of this important substance minutely, but it may be necessary to state, that the gluten may be procured by kneading and washing a piece of dough, made with wheat flour, in a stream of water, till all the globules of fecula are washed out. The gluten thus obtained is a greyish mass, elastic, like Indian rubber, when moist, and incapable of being dissolved in water. It is these two properties which render it so important in bread-making.

When a loaf is put into the hot oven, the steam and gases expand within it, and raise up the elastic gluten into bladder-like vesicles; and by this means expose the globules of fecula in the dough more uniformly to the heat than could be effected without such agency. In consequence of this they burst; and in a well baked loaf of bread not a single unburst globule of fecula can be found. On the Continent this is practically understood in the districts where they feed their horses chiefly on bread, as in most parts of Belgium, Prussia, and Switzerland. The bread thus given to horses is coarse, dark-coloured, and rather sour, from leaven being employed instead of yeast; but the partial ferment-

* According to the experiments fully related in the 10th and 11th volume, pages 253 and 52, of the Transactions of the Highland Society, it would appear that cattle thrive as well on raw turnips and potatoes as on prepared, and yield more profit. The point has not yet been sufficiently experimented on.

t we have no doubt that boiled corn would fatten cattle better than raw.—
EDITOR.

tation caused by the leaven must assist in bursting the globules, and setting free the dextrine from the action of the acid thus developed.

According to M. Raspail, and the fact has been stated by others, the more of other fecula we mix with good wheat flour, containing its due proportion of gluten, the less increase of weight does the bread acquire. For example, six pounds of flour will produce eight pounds of bread; but if three pounds of potato-starch be mixed with three pounds of wheat-flour, instead of eight pounds of bread, there will only be six pounds. He explains the circumstance from the globules of fecula while unbroken not imbibing water, but being only moistened by its adhering to them; while the gluten sucks in water like a sponge, and the more it is kneaded the more water it will take up. The mixture, therefore, of other flour with that of wheat diminishes not only the weight but the nutritive materials in the bread.

Nutritive Principles of the Food of Plants.—It is stated in most elementary books, that the chief food of plants consists of carbonic acid gas diffused in water, together with potass and some other matters apparently not well understood. But a plain agriculturist not acquainted with science will very naturally ask how this is proved. By burning plants, indeed, he knows that charcoal (*carbon*) and potass may be produced; but in that case these are in a very different state from the one in which they exist in the growing plant. M. Lassaigne, the able Professor of Chemistry at Alfort, devised the ingenious experiment of analyzing the chemical constituents of seeds before and after germinating, and in this way arrived at one method of proof of the facts just stated; yet the plain farmer who might have witnessed such analysis would readily make a similar objection to it with that of procuring charcoal and potass by burning, namely, that it was an artificial process, and therefore calculated to change the state of the substances discovered.

In order to elucidate these points, confessedly difficult and obscure, M. Biot undertook the investigation, by applying his newly discovered and powerful test of the rotatory polarization of light. Before giving any details of M. Biot's experiments, however, it may be well to state the views of M. Raspail re-

specting the imbibition and flow of the sap, these being rather novel as well as probable.

Circulation of the Sap.—All growing vegetable textures are composed of cells, every where closed, containing a fluid, which is in continual motion so long as the temperature is above 32° Fahr. The cells adhere to one another, or rather are fixed to one another by a sort of root or pedicle (*hilum*), often too minute for observation; and it is this, and the globules of the cell, which, being lengthened out and expanded in the progress of growth, give origin to new parts, or to the enlargement of old ones.

The circulation of the fluid in the cells, originally discovered by Corti in the *Chara*, cannot be observed when the cells are opaque or the fluid transparent; but an idea may be formed of it by filling a tube with spirits of wine, having some raspings of cork in it, and holding it in the hand, when the heat of the hand will cause a current to rise from the bottom up one side of the tube, and the cold at the top abstracting the heat from the particles as they rise, will cause an opposite current to descend on the other side. The difference of the vegetable circulation from this experimental one, consists in its being caused by a living principle, and not heat, though a certain temperature is indispensable. M. Raspail terms the operation of this principle in circulating the sap, *aspiration* (meaning by this something like suction or attraction), and *expiration* (meaning something like expulsion or repulsion), the sides of all the cells of growing plants alternately aspiring and expiring, or attracting and repelling fluids.

The membranes of plants, as well as the cells composing them, aspire and expire fluids; and when these membranes form a tube with branches more or less composed of net-work or reticulations, the fluid forms one continuous current in every part of the tube.

The stems and branches of all plants are formed of cells, which, from having been originally globular, expand by growth; and by the pressure of other cells expanding around them, take a wedge-like shape, the thin portion forming their point of attachment or pedicle (*hilum*). The membranes thus formed may be conceived to sheath each other, the inner sheaths being inserted by their wedge-point (*hilum*) into the sides of the outer

ones. These mutually sheathing membranes besides are traversed both across and lengthways by a net-work of vascular canals, and consequently the fluid transmitted by each wedge-point must necessarily rise along the side next to the part above the wedge-point, falling down the opposite side, and again rising along the part below the wedge-point, or the contrary. At the same time a portion of the fluid is transmitted to the wedge-point of the next enclosed sheathing membrane, where the circulation will take a similar direction.

The flow of the sap from the cut ends of a plant may thus be explained; for on each cut surface there will be alternately one-half of a sheathing membrane, the fluid in which was rising up, and another half in which it was falling down.

The branches are always inserted by the wedge-points (*hila*) of their component sheathing membranes into the trunk or stem, and, consequently, the circulation of the fluid at the junction is the same as that just explained.

The sheathing membranes of the root, it must be remarked, do not terminate in the outer sheathing membrane or burso of the stem, but penetrate to one of the inner ones, and hence the rising sap, as yet not organized, is conveyed to an inner sheath.

The strong attractive power of the tips of the root fibres, through which alone the liquid food of plants is transmitted, may be seen when roots have been forced to grow between stones; for the tips will be found to adhere more or less firmly to the stones, while the other parts of the root are loose and free. In the same way particles of earth will generally be found adhering to the tips of the root-fibres, having been attracted by the suction or aspiration of the spongiole. (*Chimie Organique*, 811, &c.)

Changes in the Sap.—The preceding are the views of M. Raspail, which further researches may either confirm or refute. The following are a small portion of the interesting experiments and observations of M. Biot on the sap and its changes, and these, it may be remarked, wear more the air of fact, and look less theoretical, than Raspail's statements.

M. Biot first proposed to himself to ascertain, by means of circular polarization, the presence of the gummy or saccharine principles in the sap of trees, and to trace these principles as connected with the nourishment of the young buds in spring. Some of the facts which he discovered were very remarkable.

He pierced with holes, sloping slightly downwards, several species of trees, early in February,—the almond, the birch, the hornbeam, the maple, the ash, the lilac, the mulberry, the walnut, the elm, the poplar, the plane, the willow, the elder, the sycamore, the lime, and the vine,—fitting into each hole a dry reed, with the inserted extremity cut sloping, and scarcely penetrating deeper than the bark. The other extremity entered a small phial, suspended by a bit of wire, and luted with a mixture of oil and wax, immiscible in water. The flowing sap was collected in these phials, and when any evaporation of the watery portion occurred from the temperature of the tree being higher than the air, it was condensed within the phial. He was not contented with experimenting on one tree of a species, but selected several of the same sort in various positions and exposures; and he also fixed on the same tree a considerable number of phials, at various heights from the ground.

In the birch he both discovered that the sugar in the sap is not cane but grape sugar, and also that the sap actually flows progressively from the root to the summit, the flow varying with exterior physical causes, which serve to modify it. The walnut, the sycamore, and the maple, did not in February shew any flow of sap; and M. Biot took advantage of their state of rest to examine their interior by having a number of trees of these species cut down on purpose. It was remarkable that the interior of the birch trees were found to be without moisture, and even quite dry, while the walnut and sycamore trees were distinctly soaked (*imbibé*) with moisture from the inner surface of the bark to near the central pith. On being pressed, also, the moisture could be squeezed out, and the oozing was most distinct between each of the circles constituting the annual rings of wood. All this was observed while there was no flow from the reeds into the phials except in the birch.

The walnut trees began to give a few drops about the 11th of February, in the phials placed about seven inches from the ground. The sap thus collected was not fermentable grape-sugar, like that of the birch, but crystallizable cane-sugar, for it gave a strong polarization towards the right, while that of the birch was towards the left. The run into this lower phial, after continuing abundant for several days, began to diminish towards the end of February, and at length it ceased altogether. The

phial immediately above it, about a yard from the ground, also gave a very small quantity, while all the other phials on the same tree, to the number of eighteen, remained quite dry.

What appeared most singular was, that this individual walnut-tree was known to be rather a late one, while another very large one, at a hundred paces distant, known to be about fifteen days earlier, gave no trace of sap in fifteen phials which M. Biot had attached to it. He began, accordingly, to suppose that this early walnut, as well as the sycamores and maples, had been pierced too late, and that the spring flow of their sap was over; or rather that, in the then state of the atmosphere, they evaporated as much sap as they received from their roots. The flow, of course, would not again take place unless the evaporation should be checked by the occurrence of cold weather. This actually did occur, the thermometer falling to one degree below zero, followed by a sharp dry frost, when the maple, sycamore, and walnut trees began to flow, continuing thus till the 16th of March, when the flow began to diminish. M. Biot says, the effect of the cold on the birch tree was very different, but gives no details.

M. Biot distinctly proved that the sap near the root is less dense, and less rich in saccharine matter, than higher up in the trunk or branches, a fact previously stated by Mr T. A. Knight, but explained by him to arise from the sap in spring mingling with the condensed nutriment deposited in the roots the preceding autumn. M. Biot thinks differently, believing it to arise from the watery portion of the sap being in its ascent either diffused through the cellular substance, or evaporated, or both; and he proved, that, though the sap collected in the phials at different heights from the same tree was more dense and rich the higher it was procured, the portions of wood and bark containing the sap gave exactly the same proportions of saccharine or nutritive matter at all heights.

M. Biot farther discovered, that the swelling and opening buds (at least of the lilac) have the power of decomposing the sugar of the sap, and of appropriating the carbon contained in it, in the same way as he proved the seed-leaves of corn to decompose the fecula contained in the grain, and change its dextrose into the sugar which nourishes them.

Observations on the Growth and Nutrition of Corn.—M. Biot, finding that the slow growth of trees was not so well adapted to some of his experiments as the quick growth of annual plants, made choice of wheat and rye for observation. It has long been known to physiologists, that, in the process of germination, the farinaceous matter (now known to consist of globules of dextrine in their envelopes) is changed into sugar, which serves for the nourishment of the young plant up to the period when its seed-leaves and primary roots make their appearance. But when the supply of nourishment contained in the seed has been exhausted, the young plant must depend on other sources to maintain its growth; and hitherto it had not been experimentally determined what these other sources of nourishment really are, what modifications they undergo in the various parts of the plant, nor in what manner the different portions are transmitted to the nascent seed in the ear to nourish and mature it.

It is important, in all such inquiries, to distinguish the solid parts, which constitute the frame-work of the plant, from juices or soluble materials, which, constantly formed, destroyed, and renewed, are carried into all the vegetable texture for its nourishment. The first, or solid materials, can be examined by chemical analysis after a plant is dead and dried, but it is different with the other parts or liquids examined by M. Biot.

Rye.—He made his first observations, the 3d of May, on plants of rye already in the ear, but not yet in bloom, the period of blooming being still at some distance. He treated the roots, the stems, and the ears, each separately, with water, submitting them to the proofs of circular polarization, and then he treated the watery extracts, condensed but not to dryness, with spirits of wine; submitting to the proofs of polarization the precipitates as well as the substances not precipitated from the liquids. In a word, he tried, by adding to each the yeast of beer, whether they were susceptible of fermentation, again examining whether their rotation was diminished, increased, or changed in direction.

The matter from the roots gave traces of an exceedingly feeble rotation towards the left, but when it was observed, M. Biot had not discovered that a mixture of cane and grape sugar would, in a manner, neutralize the right and left rotation. The

stem indicated a proportion of grape-sugar turning to the left, and of cane-sugar turning to the right, as well as gum precipitated by spirits of wine, and turning to the left with a force similar to gum. Twelve days afterwards, the 15th of May, while the ear was still far from blooming, the stem presented a mixture of the three substances, but with a considerably larger proportion of cane-sugar, proved by rotation towards the right before being fermented.

The matter from the ear on the 3d of May, and before blooming, gave very different results from the matter of the stem; for M. Biot could not detect in it any sugar, either grape or cane, but only sugar of starch, of which fermentation enfeebled the circular power without changing its direction. The precipitates also formed by spirits of wine, instead of having the characters of gum as those of the stem, shewed only flakes similar to the envelopes of dextrine in the mature grain. These results accord with the observations of M. Raspail, who ascertained that, before blooming, the grains of fecula in corn are extremely small, and that their soluble matter is gradually absorbed by the seed organ (*ovarium*), which it serves to nourish. M. Biot, as yet, found no dextrine.

After blooming, the composition of the ear was found to be very different. The 15th of June, the young grains of rye taken from the ear, already contained globules of fecula containing dextrine, along with some sugar of starch, but no trace of cane nor grape sugar. It follows, M. Biot infers, that the cane-sugar, the grape-sugar, and the gum, which are contained in the stem and leaves of rye, are changed in their nature on passing the neck of the ear (*le collet des épis*), supplying materials for nourishing the young grain, which forms it into dextrine and its envelopes.

Wheat.—In his observations on wheat, M. Biot was more particular than in the case of the rye to keep separate the different parts of the plant, and, in consequence, discovered differences of composition, which he could not have beforehand imagined.

The 19th of May, he took young plants of wheat whose ears had not issued from their sheath or hose, he carefully separated the sheathing leaves from the cylindrical stem, and treated the two separately with water, alcohol, and fermentation. The

stems like those of rye presented three carbonaceous substances, namely, grape-sugar, cane-sugar, and gum; but subsequent observation showed, that the proportions of these three substances varied much during the progress of vegetation. The 20th of May, the cane-sugar evidently predominated; but the 4th of June, when the ears began to bloom, the stems gave a rotation towards the left, and afterwards preserved this rotation, shewing that the cane-sugar had become much less abundant in the stem.

The leaves gave very different results; for though they contained three substances, the cane-sugar was proportionably much greater than the grape-sugar, the contrary of what was found in the stem; and instead of the third substance being gum turning to the left, it produced a rotation towards the right, appearing in fact to be dextrine. The leaves of wheat continue to preserve the same composition till they begin to grow yellow and wither, an effect that uniformly commences at the tip of a leaf, and on the leaf nearest the root; but after this, scarcely a trace of sugar or dextrine can be found in them, all, it would appear, having gradually passed into the stem to nourish the ear, in the same way as the carbonaceous materials of the leaves of trees descend under the layers of the inner bark and pulp wood (*albuminum*), to nourish the young cylinder of wood and bark, which, similar to a hollow stem of wheat, is annually formed, and moulds itself upon the old frame-work of the wood.

In wheat, therefore, as well as in rye, the base of the stems can derive nourishment partly from the leaves and partly from the soil, and the summit of the stem can draw nourishment from its own leaves, as well as suck up the sap from below; but the ear, when it issues from the sheath, appears to exercise on the proper juices of the top of the plant a powerful absorption, causing them to rise rapidly in proportion as they are furnished by the base of the stem.

The 4th June, M. Biot took plants of wheat in full bloom, and depriving the stems of their leaves, parted them into halves, the tops in one parcel and the bases in another. The extracts from the base, when examined by polarization, indicated almost twice as much sugar as the extracts of the tops of equal density; and at the same time he found, that the saccharine principles abounded in the ears of the wheat, in the form of cane-

sugar and sugar of starch, together with a substance similar to, if not identical with, dextrine.

Ripening of Corn, and Ploughing of Green Crops for Manure.—In proportion, it has just been shewn, as the fecundated ear increases in magnitude, the leaves near the root begin to grow yellow and dry, in consequence of the stem drawing from them the carbonaceous materials which they contain. As the growth advances, the base of the stem becomes yellow and dry in its turn, while the upper part remains green, and continues to nourish the ear.

These beautiful researches of M. Biot afford interesting explanations of several agricultural practices hitherto not well understood, at least in a scientific point of view. For example, when the base of the stem begins to become yellow and dry, if the corn be then cut down, though the grain is not ripe, it will continue to be nourished at the expense of the green matter in the upper part of the stem, almost, if not quite as well, as if it had remained uncut, and will thus ripen well; while, having been thus cut down early, much loss from shaking is prevented, besides the chance of loss by *lodging* from heavy rain and wind. M. Biot's experiments, from his well-known high character for rigid accuracy, are therefore well calculated to give farmers confidence in cutting down their corn, as soon as the lower leaves and the lower part of the stems are yellow and dry, though the upper parts be green.*

* It is a good practice to cut down every kind of grain before it is fully ripe in the grain or the straw, and that for the reasons just enumerated in the text. But, as M. Biot's observations and common practice do not exactly agree as to the symptoms which determine the time of cutting, it is as well to notice the difference. In a *fine season*, farmers cut down when they find the neck of the straw immediately under the ear free of juice, when twisted round between the finger and thumb; and do not wait until "the lower part of the stems are yellow and dry," because they find in such a season the straw *to die from the ear downwards*. This fact, we conceive, does not militate against M. Biot's theory, for as the absorbing power of the ear at the top of the stem is always powerful, it must be the more powerful the nearer the ear approaches maturity, and, of course, the part of the stem nearest the ear should first become dry. In a *bad season*, on the other hand, the lower part of the stem first becomes yellow and dry, after which, of course, the crop is not allowed to stand; for, in such a season, the ear never becomes mature, having, of course, less absorptive power, whilst the vitality of the root is early destroyed by the combined effects of bad weather and ungenial state of the soil.—
EDITOR.

Again, as the leaves and stems of plants, while green, contain sugar and other carbonaceous materials for nourishing the seeds and bringing them to maturity, it follows that, if they are in this state ploughed down into the soil, they must greatly enrich it with all the products ready prepared for the nourishment of plants.

It has been proved, indeed, by other experiments previous to those of M. Biot, that the leaves and all the green parts of plants, decompose the carbonic acid gas of the air, appropriating the carbon and setting free the oxygen; and hence it has been inferred, that the carbon thus derived contributes to form their mass of sugar and gum, additional to the sap absorbed from the soil by their roots. This view is corroborated by the difference which M. Biot has shewn between the composition of the leaves of wheat and the stem, which is more especially supplied from the soil. If, then, a portion of the solid framework of plants is derived from the air in the form of carbon, the ploughing down of green crops for the purposes of manure, gives to the soil more than the plants, while growing, had extracted from it.

We may well conclude with M. Biot, that "every positive determination in science is susceptible of progress and of useful application, though these may be distant. A microscopical observation, or an optical property, which at first appears only curious and abstract, may thus in time become important to agriculturists and manufacturers."

HORTICULTURE—ON THE CULTURE OF THE ONION, THE LEEK,
AND THE EARLY POTATO.

By Mr TOWERS, Author of the Domestic Gardener's Manual.

1. THE ONION.—The onion, in whatever point of view we consider it, is truly valuable; it is required in all gardens, but to the cottager it is all but indispensable. Not only is it hardy, of easy culture, and abundantly prolific; but it may be rendered a source of considerable profit. As a culinary vegetable it has its faults, for, not to dwell upon peculiar odour, which to some is very disagreeable, it produces in some constitutions a sort of feverish heat, which is attended with considerable restlessness and irritability; but this effect appears to be of rare occurrence, for it is generally found to stimulate the circulation healthily, to

promote general warmth, and to prove one of the most effectual preventives of cold or chill, in situations of exposure, which might otherwise be productive of serious mischief.

Its natural history will occupy only a few lines, but it is interesting. The native country of the bulbous onion is not clearly ascertained, nor is the date of its introduction. The onion is referred by modern botanists to the natural order *Asphodeleæ*, of which asphodel is the type; these natural orders, till they be better understood, or, in other words, more simply and perspicuously described, tend to confuse and perplex the student,—the Linnæan artificial arrangement, with all its defects, can be applied, by the mere tyro, and with the best effect. We find onion—*Allium cepa*, in the 6th class, 1st order, *Hexandria Monogynia*, because it has six stamens and one pistil. The flowers are produced in a clustered umbel, at the summit of a hollow or tubular, somewhat conically swollen stalk. These numerous flowers are protected by a sheath, or *spathe*, which in due time opens and discloses them; the flowers are greenish-white, each individual is 6-parted; it has what botanists term a *perianth* of six lobes; the capsule or seed-vessel has three angles, three valves, and three cells. The root is a tunicated or coated bulb; and this body, for root-proper it is not, is formed during the growth of the first year by the leaves—as itself in the *second* year—that is, during the processes of fructification, becomes the origin or source of the leaves. The development of the onion is perfectly wonderful; it claims the most minute and scientific investigation, especially when we view its progress from the seed, and compare *that* with the phenomena of the secondary growth. The real roots are fibres sent forth from the base of the coated bulb, but they are connected with germs of future bulbs, which are marked by the coats of the parent. Without dwelling longer on these mysteries, I shall endeavour to elucidate them by the facts, which the first mode of culture, now to be described, will elicit. I trust that they will be practically investigated by many acute botanists.

Summer Onions.—According to the stock required must be the preparation; and the first step to be taken, is the selection of an appropriate plot of ground; but this requires much consideration. It has been correctly stated, that bulbs, in genera^l;

like a great supply of water, but it must not lie about and swamp the bulb itself; tulips, hyacinths, narcissuses, grow well and bloom in glasses, without the presence of a particle of earth; but the bulbs are not immersed; they are supported by the contracted neck of the glasses, and the fibrous roots only are suffered to reach the water. The object in open ground culture is to confine the bulb to a light, dry, and rich surface soil, abounding with free, open sand, and at the same time to provide a copious supply of moisture at a considerable depth below the surface, for the nutriment of the roots. The Dutch attain this object readily by natural locality, but with us the case is very different, and we must find substitutes for underground irrigation. Onions send their roots deeply into the subsoils, and to do them justice, this must be properly prepared. Chemistry teaches us that decaying vegetable matter yields the elements of water very copiously, and at the same time deposits a quantity of carbonaceous matter exactly suitable to the nutritive organs of the plant. The science of horticulture adduces a volume of facts which prove that the decomposition of vegetable putrescent substances, and the simultaneous formation of nutritive sap, are effected, with great energy, by the vital vegetative principle. Thus, causes and effects are ever in active operation. Upon this theory it is that I recommend the introduction of decayed leaves of trees, either alone, or in union with a third or fourth part only of stable manure (both reduced to a blackened mass), in preference to spit-dung only, whenever it is intended to counteract the effect of parching drought. I write practically, as I shall hereafter evince, under the head Early Potato; but now for *onions*, I would advise that all the soil of the plot to be cropped, be taken out to the depth of eighteen inches, or two feet, if possible; that the bottom be rammed and made solid; and that a twelve inch bed of the leafy manure above named be put upon the solid ground. This vegetable mass would be a source of moisture and nutriment for several years; in the first instance it should be protected by a sprinkling of salt, to the extent of a peck to a bushel. Upon this lowest stratum a second, consisting of equal portions of garden soil, and of the leaf compost well mixed, should be deposited to half the depth of the first bed. The upper stratum should consist of the lightest sandy and

turfy loam, made still lighter by fine sand or wood ashes, and enriched with one-third part of perfectly reduced manure of the farm. The bed cannot be too deep, or too well prepared; but eight or ten inches of the fine sandy soil are amply sufficient. I have stated what I judge to be the best preparation; it may not suit the convenience of nine out of ten growers to adopt it; but of this every one may be assured, that, the deeper his bed of decomposable vegetable matter, the more certain will be his supply of permanent, underground moisture. Well trenched, highly enriched, light, garden soil, will, in most seasons, yield good onions; but perfection can be attained only by the most deeply prepared soil.

This preparation is suitable to every method of growing onions, and therefore I shall not dwell upon it again. Every species of bulb prospers most under the powerful action of solar light; therefore, when the full exposure of the plants can be made consistent with that radical supply of water which the plant revels in, the bed cannot command too much sun.

Season of Planting.—In February, or very early in March, a number of small onions of the variety called *Spanish* or *Reading*, should be collected, the bulbs not to exceed an inch and a half in diameter; those of one inch will do very well, but they ought to be round, flattish, perfectly formed, and not in a growing state. It must be remembered that each of the onions should produce two, three, or four new ones, and the calculation might be founded upon this probable return. The upper soil of the bed, if it be dry, should be sprinkled, and then beaten with the flat side of a spade, to a firm and level surface; it is then to be set out in squares, by means of a line, and any sharp-pointed tool which will simply mark the surface; the angles of the squares to be nine inches apart. Some persons might prefer to stretch the line, and to plant row after row, the onions to stand in quincunx or alternate order; but whatever be the mode adopted, the surface should not be broken up, and an onion is to be placed *on the soil*, at every angle of the squares, or at an equal distance, along the line, and firmly pressed down till it be half immersed. Care must be taken also to let the root be fixed straight, so as to send its fibres perpendicularly downwards; the growth of the plant will then from the first be quite upright, and

the bulb will be fixed firmly in its place ; whereas, if the bulb lie on one side, it is very liable to be displaced. Worms are troublesome visitors on these occasions ; therefore soot, air-slaked lime, or wood-ashes, should be dusted freely over the surface ; the operator must also be on the alert to refix any bulb which may be disturbed.

If the weather be early dry and parching in March, water may be safely given by making holes, sloping diagonally, from the centre of the intervals towards the lines of bulbs, but to at least four inches below them, and in these, water may be freely poured. In frosty weather, of course, nothing of the kind will be attempted, but in dry warm seasons, too much water cannot be given to the under strata ; the surface soil, on the contrary, should be as dry as possible.

Under favourable circumstances, growth will be rapidly established, and the gardener will have to observe many interesting and beautiful phenomena. Leaves will at first be developed, but these are not now the organs of nutrition to the parent bulb, from the coated layers of which they indeed proceed. A system of foliage is indeed vitally required, but its energy, in the present instance, can be diverted from that course which nature ordains it to take. In this second year, the leaves are destined to nourish the progressing organs of fructification, and it will be observed that each bulb, sooner or later, produces a flower-stalk, with its umbel of flowers concealed within their spathe at the summit. *As soon as this head at the point of the flower-stalk shall be distinctly seen, it must be pinched or cut off.* Upon this operation depends the entire success of the plantation ; for if the flowers develope, and the seed-vessels enlarge, the bulbs will have no successors. A second, perhaps a third, flower-sheath may appear, and must be immediately obliterated ; this done, the leaves become stronger, and their laborated juices are instantly diverted, and called in aid of those germs of young bulbs which lie in embryo, and would perish with the parent, were the seed-bearing processes allowed to be carried on to any considerable extent.

After the final excision of the flower-stem, a singular change, or rather a new development, takes place in the bulb. From being soft and spongy, owing to the previous exhaustion of the

layers, they begin to re-acquire solidity,—that is, they appear to acquire it, for the phenomenon is in reality dependent upon the progressive, but almost secret, production of one or more new bulbs. Nothing can be more impressive than this mysterious development ; its course can scarcely be traced. I do not dare to assert, that a practised eye, gifted with a peculiar quickness in discerning physiological mutations, may not mark and detect *those* which are wrought in the formation and enlargement of the new onions ; but I do say, that among above ninety plants which I obtained last summer, neither I myself nor a youth who planted the old bulbs, could trace the progress of the new ones. I may be excused for quoting the passage which I wrote in my diary, because it may be considered more simply true to the *then* observed facts, than any thing I could now pen from recollection.

“ As the leaves advanced, the bulbs became soft and exhausted ; as flower-heads rose, they were pinched off and gradually new bulbs formed, two, three, and four to each, the old bulb and skin vanishing in a way not to be detected.”

I admit that I have adopted this mode of planting but once, and therefore may have been in some degree misled. A future experiment will perhaps lead to more correct observation. I hope, however, that numbers may be induced to inquire for themselves ; they will assuredly be recompensed by a very excellent crop of good onions, of a medium size, either in June or July. Mine of 1835 was retarded by the extreme drought and piercing nights of May, and I had not attended to the previous preparation of the bed. I have expressly selected the Spanish or Reading onion for this summer crop, because it is mild and pleasant in flavour, and may be grown to greater perfection at the season ; the process is worthy of the variety, and the variety is adapted to the process. The summer onions do not keep very long, nor is the Spanish a long keeper at all ; hence particularly improper for the full winter crop, which ought to be hardy and of higher flavour. I might have chosen the *Tripoli*, which produces the largest bulbs, so large, indeed, that Mr Knight assured me he had grown several bulbs that weighed more than two pounds each, but it is very apt to decay. Many gardeners affect the variety termed the underground or *potato*

onion, but the process I have described furnished, I think, an excellent substitute for it, especially as the flavour of the Spanish is far more delicate than that of the underground bulb. I claim none of the merit of discovering the foregoing method of multiplying the bulbs; but am certain that if practised by any, it is known to very few persons, and my remarks will tend to diffuse the knowledge of it.

Seed-crop.—These fine large onions may be raised pure to their originals, by planting imported bulbs in a warm situation, exposed to the sun. The season might be the same as that of planting for a summer crop, and the soil a rich, mellow, sandy loam, well manured. The foregoing process for bulbs is adapted to the culture of seeding onions, with this especial exception, that the flower-heads must be encouraged, and each stem supported by a stake, as it advances in height. I am inclined to believe that were the imported bulbs of the Tripoli, Spanish, and Portuguese planted, one in a large pot of very rich soil, about the first week of January, protected under glass in a common garden-pit or vinery, not in action, and finally transplanted, with the ball of fibres entire, when all danger from severe frost had ceased, a month would be gained, which in the north might be found of some consequence, as the seed would be matured by an August sun.

Crop for the Winter, from Seed.—The preparation of the ground ought to be as complete as that for bulbs, above detailed; but if certain obstacles to it are found insurmountable, the grower ought to spare no labour or reasonable expense to trench and enrich the plot intended for the seed, to the depth of at least eighteen inches. If the subsoil be a heavy clayey earth (which soil ought never to be brought to the surface), it will be right to add materials at the top, and these ought to be of a rich light quality. A free black garden soil, replete with vegetable remains, must tend to produce fine solid bulbs.

The *variety* I recommend is the *Strasburg* (Flemish or Dutch, by some persons called also the Essex onion); it is a winter keeper, the skin of a reddish-brown, the figure a pointed oval, the greatest diameter being, from root to point, precisely the reverse of that of the Spanish onion. The bed may be prepared late in the preceding autumn or at any time between Ja-

nuary and the middle of March, provided the weather be fine. Drill-sowing is greatly preferable to broad-cast ; a bed four feet wide will contain seven or eight rows, six inches asunder, and the Strasburg onions may stand only four inches apart in the rows. It is customary to scatter the seeds over the surface, and rake them in ; or to draw drills half an inch deep, and trickle the seeds along them to the extent of about four in an inch. I mention these methods that the reader may form a choice ; but the philosophical mode of proceeding—that which is dictated by the structure of the onion—is the following :—After the soil of the bed has been fully prepared, and made also extremely rich with very rotten manure at and below the surface, to the depth of four inches, it is to be beaten with a turf-beater till it becomes quite solid and compact. Lines are then to be scratched on this surface just deep enough to receive the seeds, about three in an inch ; a very little light sandy earth is then to be sifted over the bed, merely to cover the seeds. An ounce of seed will sow a bed, broad-cast, twenty-four feet by five feet ; half the quantity will suffice for drill-sowing.

It is indispensable that the ground be moist, though not wet ; and if the winds and sun of March, or early in April, tend to parch the surface, the bed must be covered during the day with mats, and the ground sprinkled freely at night, if the weather be mild, till the onions rise. When they have grown three inches, the plants should be thinned, by hand, to two inches apart ; and as they advance, numbers may be drawn as young onions, till they stand at the prescribed distance for bulbing. I may remark, generally, that this method of sowing is equally favourable to the large growing varieties, or even more so than to those with smaller bulbs.

The *course of culture* consists in lightly pushing the Dutch, or thrust hoe, along the earth between the lines, not to raise it, but to kill the weeds. Onions like rain, and if favoured with a frequently recurring supply of it, in moderate quantity, followed by intervals of bright sunshine and a generally warm temperature, they will begin to form bulbs in June ; these will enlarge rapidly, and attain their full dimensions in August and September.

Many persons twist the stems a little above the neck of the bulbs, as soon as the upper part of the leaves become yellowish. I believe that this operation, by destroying the vitality of the leaf, tends to abridge the period of maturing, but that it never does, nor can transform a long and ill-shaped onion into one of good growth and figure, by diverting more of the sap to the bulb.

When the leaves decay and shrink, the onions are to be drawn up, and laid to dry on the surface of a compartment of ground or gravelled spot, more of the sap exposed to the full sun; an airy shed, open to the south sun, is excellent, as no rain can fall on the bulbs, which ought to be often turned, so as to become quite dry, speedily.

To *preserve the onions* during winter, they may be either tied compactly, in neat order, to ropes of straw, or be laid on the floor of an airy loft. Frost does not appear to injure them, nor will the *searing* of the part with a red-hot iron, whence the fibres emerge, which, if carried to the extent only of burning off the mere tips of the root-processes, will prevent the early sprouting of the leaves, without causing decay.

The peculiar excellence of the foregoing process is this,—it constrains the onion to become a *surface-bulb*, which rests and flattens upon the hard ground, if it be by constitution a broad variety, without becoming what is called “*bottle-necked*.” If, like the Strasburg, the bulk naturally affects an egg-like figure, it acquires a tendency to increase in horizontal bulk, hence to acquire solidity in lieu of sponginess. The roots proper push downward, and feed upon the moisture-yielding aliment; and, if favourably started at first, the plant never flags. Even without attending to the under-surface preparation, I have procured bulbs, the major part of which averaged eight or nine inches in circumference; many individual bulbs measured much more.

Crop by Transplantation.—There are two methods of thus obtaining very large onions. The *first*, I cannot better describe than by referring to the observations of T. A. Knight, Esq. because they give an insight into the rationale of the process. Every bulbous-rooted plant, it is stated, “generates, in one season, the sap or vegetable blood which composes, in a great measure, the bulb; and the quantity accumulated, as well as

the period required for its accumulation, varies greatly in the same species of plant, under more or less favourable circumstances. Thus, the onion of the south of Europe acquires a much larger size during the long and warm summers of Spain and Portugal, in a single season, than in the colder climate of England; but under the following mode of culture, which I have long practised, *two summers* in England produce nearly the effect of one in Spain and Portugal, and the onions assume nearly the form and size of those thence imported. Seeds of the Spanish and Portugal onion are sown at the usual period in the spring, *very thickly*, and *in poor soil*; generally under the shade of a fruit-tree; and, in such situations, the bulbs, in the autumn, are rarely found much to exceed the size of a large pea. These are then taken from the ground, and preserved till the succeeding spring, when they are planted at equal distances from each other, and they afford plants which differ from those raised immediately from seed, only in possessing much greater strength and vigour, *owing to the quantity of previously generated sap being much greater in the bulb than in the seed*. The bulbs thus raised often exceed five inches in diameter, and being more mature, they are with more certainty preserved in a state of perfect soundness through the winter than those raised from seed in a single season."

The following remarks, under the head "*Allium*" of the *Penny Cyclopædia*, by an eminent phytologist, are pertinent. The method to procure large bulbs is, to "take the small onions of a late sown crop of the previous year, and to plant them in rows in the beginning of April, laying them on *the surface of the soil*, each surrounded with about a handful of decayed and nearly dry manure. All the time that is usually lost in seed-sowing is thus avoided, and the moment the bulbs push forth new roots, they find themselves in the midst of an abundant store of food, which continues to supply them with nutrition during the whole of the growing season. As they advance in size, the soil round the bulbs is frequently disturbed by the hoe, for the sake of exposing, as much as possible, the carbonaceous matter of the manure to the action of the atmosphere." (Reference for further information is made to the *Horticultural Trans.* vol. i. p. 158; vol. iii. p. 67; vol. iv. p. 138.)

On the foregoing I observe, that the period termed a *late* sowing ought to have been specified; for a sowing made in the summer-produced plants, which my garden, at this time (December 21.), exhibits standing, as thickly as possible, and green as grass, fit to draw for salading; and these young, unbulbed onions will, I little question, if they survive the degree of frost which *may* visit us, furnish a capital bed of very large bulbs, by removal to a well prepared plot in April. The writer, I believe, labours under a mistake if he supposes the manure *on* the surface and around the bulbs to be decomposed by atmospheric influence, in a way and time most suitable to the organs and functions of vegetable nutrition. It is to the vital electrical energy of the roots that we must look, if we hope to discover the causes of the *production of sap*. Whatever may be the decomposition *superficially* effected by atmospheric divellent attraction, the products of it will be borne away on the wings of the wind, in the forms of carbonic acid and hydrocarbonates. But enough, and not to be hypercritical, I think that if any clever gardener will deliberately combine the two processes of *transplantation*, and of solidifying the surface by the turf-beater, he will procure a finer set of bulbs, true to their original type, with greater facility, and fewer sources of disappointment, than by any other mode hitherto described.

The *second method of raising a transplanted crop*, and by which Mr Knight assures me he obtains his immense Tripoli onions, is to sow in a gentle hot-bed in January, and to remove the small plants to their summer garden plot during April. In my soil I could not during the droughts of the last two years cause the plants to take sufficient root, so as to elevate themselves from a horizontal position in time to prevent their destruction by parching heat and wind, or by worms. I cannot, therefore, practically write in confirmation of the practice. However, when a garden furnishes a rich, sandy, or peaty soil, which abounds in vegetable matters, and to which water can be conveniently and duly supplied, there can be no reasonable doubt of success.

2. THE LEEK, *Allium porrum*, is one of the same family as the onion, and, in common with it, the origin is unknown. It does

not produce a bulb; its body or stem is composed of a number of broad, juicy leaves, the bases of which are white and tender, and enclose each other in alternate order. This leafy stem can be made to enlarge very considerably, insomuch that a large leek will measure from two to three inches, and being perfectly blanched to the length of six inches or more. Two methods of planting are adopted; one of which, the *old method*, consists in sowing very early in the spring (not later than the middle of March), in beds of very rich, light earth. Drills, seven or eight inches apart and half an inch deep, are to be drawn or pressed on the level surface, the seeds scattered along them, covered with light, fine earth, which is to be pressed gently upon them; for it should be always remembered that nothing tends more to promote vegetation than the close contact of the earth. The plants are thinned out to three inches apart in the rows, and the earth kept clean and open by occasional gentle hoeings. If a due supply of rain fall, the leeks will be as large as a quill soon after midsummer; and if the soil be very good, they may be much larger.

In July, deep drills are made in another plot of ground much enriched, two feet asunder, and along these the leeks are planted by a setting-stick, after their roots have been curtailed to within an inch of the stem, and the top of the leaves trimmed off. The leeks are fixed firmly in small holes, just deep enough to receive the roots and the base of the stem, but no more. They soon lay hold of the soil, and, as they advance, the earth on each side of the furrow is drawn to them; and this moulding up is repeated from time to time by drawing earth from the intervals. By the month of October the leeks attain their full size, and will remain firm and good during any ordinary winter.

The second, or *modern method* of culture, is ably described in its essentials, under the head *Allium* of the *Cyclopædia*, before alluded to. After detailing the structure of the leek and its stem, it proceeds thus:—

“As the excellence of the leek depends entirely upon the large size of this part, the attention of the cultivator is exclusively directed to that, before all other considerations. It has been found that there is no method so successful as to sow the seed early, in a light and well manured soil, and then when the young leeks have arrived at the thickness of the little finger, or even sooner, to drop them into holes about 2½ or 3 inches wide, and 6 inches

deep, in the bottom of which some very fine manure has been deposited. By this means the young plants are copiously supplied with moisture, have abundant food round their young roots, are attracted upwards by the light, and are enabled to develop themselves with rapidity, from the absence of all pressure from the surrounding earth; and when they fill up the whole cavity of the hole, as they will in time, they then blanch themselves in all the most valuable part of their stem." (Vol. i. p. 354.)

The leek benefits greatly by transplantation, and it derives nutriment by the resolution of hydro-carbonous substances into their elements through the energy of its vital principle exerted by the roots. The deeply-buried *stratum of manure* mentioned in the first part of this article, would furnish a constant supply of nutritious fluid, and increase the bulk of the stems. The portion of manure deposited in each hole acts a corresponding part in the first instance; but as it is the radical fibre, and not any portion of the base of the leaves, which becomes the organ of absorption, it would be wise, at the moment when the transplanted leek is dropped into its hole, to support the plant perpendicularly, while a quantity of soft water is poured into the hole sufficient to reach an inch up the stem. This stream, as it soaks through the manure, will wash in and puddle it, and some earthy particles also among the fibres; thus giving them the means to fix themselves at once into the medium of their immediate nutriment.

It is not stated above whether the roots are curtailed or not, but they are apt to grow to a great length, and if placed entire in the hole, would be distorted and bent upward. The leaves, however, will require no abridgment, as the moisture afforded by the first watering, and the complete shade and shelter given by the sides of the sheath of earth, will combine to prevent any degree of check which transplantation too frequently occasions.

Every one knows the use of leeks in soups, &c.; but perhaps many may not be aware that if simply boiled till quite tender, they become a very excellent vegetable dish, to be eaten with boiled

AN EARLY POTATOE.—An early crop of really fine potatoes is a very pleasant circumstance, but if with superior flavour are combined the essential qualities of mealiness and great durability, we obtain a real treasure. So many persons know how

to cultivate the potato, that farther directions may be considered *superfluous*. It is not, however, my intention to follow in the beaten track, but to describe the progress and results of an experiment conducted by me in the spring of last year, which has produced a very large crop of a variety so perfectly good, that I should deem myself remiss, were I to withhold that information which might enable others to profit by it as well as myself. Perhaps some gardeners or private individuals may have adopted a somewhat similar practice, but I have never yet seen potatoes so grown. I therefore hope that I have discovered a method of culture which may be beneficial to the domestic economy of many.

The plan had its origin in the injury which was found to result from the severe drought of 1835, and from observing the astonishing efficacy of a mass of decaying vegetable matter in counteracting its baneful effects.

A plot of ground had, in 1835, been set out in deep trenches; the bottoms of these were amply supplied with decaying compost, over which several inches of garden mould were placed for the reception of a crop of Indian corn. The mould in the trenches was at least three inches below the level of that in the intervals, and the trenches were a yard asunder. The success of the plantation was perfect, the verdure intense; in fact, without one application of water, the corn went through all its stages most luxuriantly. I dwell a little on this first preparatory stage, because the extent of the manuring may thus be made apparent.

In the third week of March I received from a neighbour a small quantity of potatoes, which he called the *Ash-leaved kidney*. They certainly had the form of that choice variety, but appeared to be generally larger. The weather during March had been so unusually wet and cold, that I dreaded a recurrence of spring frosts, as well as a protracted period of parching winds whenever the dry season might commence. To guard equally from both enemies, I dug and manured the intervals, which had already become a sort of trenches, in consequence of having earthed up ridgeways the growing corn with the mould of the spaces between the rows.

Thus, then, in March 1836, the ground was laid out in *ridges* one yard asunder, resting upon the *manured* trenches of

1835, and the trenches or low spaces between these ridges were digged and manured for the crop of summer potatoes. The weight of the potatoes above mentioned (for which two of the spaces were allotted) was $8\frac{1}{2}$ lb. ; the tubers were planted standing upright, and quite entire, four or five inches apart. They were placed upon a little earth that was drawn over the centres of the hollows, so that they were not in actual contact with any portion of the manure. Fine earth was then gradually brought down from the sides of the ridges, and placed against the upright tubers till it covered them to the height of an inch, or rather more, above the row's ends. Thus the potatoes were planted in manure trenches, a yard asunder, protected right and left by six-inch high ridges. The direction of the rows was from N. N. W. to S. S. E. ; and therefore the sun, about eleven of the forenoon, shone nearly along their entire extent.

This direction, or one more perfectly corresponding with full exposure to the sun at noonday, appears the most congenial to the potato, as the haulm is thereby maintained more upright at all times. If the broadsides of the rows are presented to the south, the plants are too powerfully attracted, and become liable to fall over, in which case, the foliage derives little benefit from the solar light, and the juices are imperfectly laborated.

The plants soon rose, but their summits were greatly defended from cold by the high ridges, and enjoyed to the utmost the midday sun. However, by the time they became three inches high, the nights were so cold that I drew earth down from the ridges, till the leaves were nearly covered with it. Here another advantage was derived from the mode of planting, for I was enabled to protect, by new and dry soil, and yet to avoid burying the sets too deeply. In a flat bed, the potatoes are planted at once from four to six inches below the surface, but in the ridge and trench method, the slight covering first given is sufficient to ensure the first vegetation, and earth in the best possible condition is at hand to be brought against the rising stems. Thus shelter, shade, and defence, each the most suitable to the desired object, are amply provided for.

The progress of the plants was such as to justify the prudence of the means adopted ; not a leaf was injured, though several frosts of severe character occurred, as, for instance, on the

29th and 30th April. They were moulded up twice or thrice, and, finally, the stems had about six inches on each side of them. This finely wrought soil operated also as an attractive medium for the development of surface roots; and the verdure of the foliage afforded ample proof of the rich supply of food which the roots imbibed.

I soon perceived that my neighbour had mistaken the variety, for these plants remained green, and the tubers immature, above a month after the haulm of some rows of *ash-leaved*, of true character, had entirely died away. I conjecture that the plants in question were the *walnut-leaved kidney*; and this the specimens I enclose to the Editor of this Journal, for inspection, may tend to verify or disprove. Be that as it may, the tubers were not ripe till Michaelmas; they were subsequently dug for table use, as required; and the remainder, finally, for stock, on the 5th of November. The eight pounds and a half yielded 120 pounds. Another row had been planted, expressly for seed, but in another plot of ground, not prepared so richly, and the row pointing east and west, *three pounds* were set, and on the 24th of October *thirty-nine pounds* were dug up. This variety is excellent, either when cooked fresh from the ground, or at the present time, after having been kept in an open cask, in a cold out-house, with no other covering than a folded garden-mat. I tried the quality in March last, when I received the seed, and have every reason to believe that the potato is superior at all seasons.

As a comparative experiment, I beg to cite the results of four rows of true *ash-leaved kidneys*, set also in trenches, in the third week of March. 12½ lb. produced 74 lb. 12 oz. only. The ground had been less prepared, and had little vegetable matter in masses within reach of the roots; the plants also being more exposed to the sun during the protracted dry weather, suffered from paucity of moisture. The potatoes were taken up as required, from July 11. to August 10. I ardently desire to recommend the fine potato, which produced so abundantly, because, among seven varieties, early and late, which I grew in 1836, I found that the bulk yielded surpassed, by more than cent. per cent., that of the very best of its competitors.

Kalendar of Miscellaneous Operations. — The months of

March and April are the periods of peculiar activity. Almost every seed crop may be sown ; every herbaceous vegetable planted ; the labour of the gardener is in constant requisition ; and so much has to be done, that at times he scarcely knows how to select, so as to perform his operations to the best advantage.

Peas, beans, potatoes, cabbages, savoys, turnips, carrots, parsneps, beet, lettuces, onions, &c. must be sown, so as to provide an ample succession or regular supply. Rhubarb, asparagus, sca-kale, artichokes, remove with greater safety in the early spring than any time of the autumn, because they speedily adapt themselves to the soil, and have not to incur the risk which wounded and lacerated roots expose them to in ground swamped for months by cold rains and melting snow.

One general rule ought, I think, to be universally adopted, it is this, to sow every seed-crop in drills ; for, though the method may require in the first instance a certain degree of labour and patience, it greatly facilitates the future operations of hoeing, weeding, and digging.

The important process of grafting, in all its forms, belongs almost exclusively to the period between the middle of March and the third week of April ; but as respects planting of fruit-trees, I think there can be no question that October is more favourable than any month of the spring, be the weather what it may.

Kidney-beans, dwarf, or runners, can seldom be sown with safety before the middle of May. Most of the broccolis may be sown either for autumnal or the following spring supply, between the middle of April and the end of May.

They who relish a constant supply of spinach ought, perhaps, to provide a bed of that fine juicy vegetable called New Zealand spinach ; it never flies off to seed, and, when properly prepared, furnishes a great succession of gatherings. It is not a *Spinacia*, but one of the *Ficoideæ*. The plants of this natural order are succulent ; and the vegetable in question greatly resembles some of the fig-marigolds (*Mesembryanthemum*). Its botanical name is *Tetragonia expansa*. I hope to investigate its character and merits on a future occasion. The seed may be sown in a gentle hot-bed in April or May in pots ; the plants are subsequently removed to beds or ridges over manure.

EXTRACTS FROM A JOURNAL OF A TOUR IN HOLSTEIN.

11th August 1835. Breakfasted with Mr B. and family, and at 11 set off in Mr B.'s carriage, accompanied by Mr Hector, to Clovensick, near Kiel, where we arrived at 2 P. M., and were received with the greatest politeness by Mr Hirschfield.

About half-way, the day being very warm, we refreshed our horses with a loaf of black bread and water; the driver and ourselves had each a small glass of Cogniac and water, and the charge for the whole was only eightpence, which, I think, would have been about three shillings in England.

After dinner, walked out with Mr Hirschfield, and visited the stables. The first contained six carriage and two riding horses, beautiful bays, docked in the English style. Also a long-tailed black horse for the use of the dragoons, every gentleman being obliged to keep a horse subject to the King's order.

This stable is 126 feet long, 44 broad, and 55 feet high; at the end is a carriage, waggon, and harness room. The next stable, under the same roof, was for thirty horses; they stand in pairs. The whole is causewayed, and a space of 20 feet in the middle for thrashing the grain. At the end are rooms for the men, corn-chests, &c., and a space above for about eighty carts of hay, and two tier of grain lofts.

We next visited the cow-houses; the first was 198 feet long, 70 broad, and 60 feet high, with four tier of stalls for 240 cows. The standards were ten inches thick, and between each, a space of nine feet, stood three cows. A trough of solid masonry ran from end to end of the cow-house, about a foot deep and two feet broad at the top, for the food and water. All these houses have doors large enough to admit of a cart of hay passing through. There was a stork's nest on the top of the cow-house, with two young ones just ready to fly; this is considered an omen of good.

The next cow-house is 96 feet long, 24 broad, and 30 feet high, with fifty-eight stalls, and a large space to feed young cattle. The space above these two houses, when filled with hay, holds about 400 cart loads. Next, the great barn, 180 feet long, 70 broad, and 65 feet high.

The crops in this country are all housed and thrashed at convenience; and a space of 24 feet broad runs through the whole of the building for this purpose.

The new barn is 152 feet long, 64 broad, and 50 feet high. The dairy-house is 125 feet long, 36 broad, and 50 feet high; and the floor is laid with brick on edge, with a slope toward the centre, through which a small stream of water runs. On the right is a store-house, and a dining-room for the servants, twenty-six in number. The fire-place or chimney is 12 feet broad; on one side is a fixed boiler, on the other large sways for hanging coppers on for dressing victuals, &c.

Next, a neatly furnished room for the head dairy-maid, and behind her's a room for a respectable old man, who superintends the whole of that department. On the opposite side is a large bed-room for twelve females. Returning back to the left is the milk cellar, down a few steps, all brick, but kept very clean. At the foot of the stair stand the salt barrels; that used for the butter is from Lunenburg in Hanover, that for the cheese from Liverpool.

The butter-room is on the left side of the stair, and is railed round. There were eighty-four casks of butter in it, containing 100 lb. each, about half an inch of salt on the top, and the heads laid loosely on—the whole covered with a clean white sheet. There were 500 milk tubs made of oak, twenty inches in diameter and six deep, with four willow hoops. They are washed after being used by six servants, with warm and cold water, ashes and coarse cloths, scrubbers and brushes, and then piled out to dry; if they got the least sour in summer, they were boiled, and underwent the same process. That morning there was on the floor 269 tubs, the produce of three milkings.

A few steps up, on the right of the milk-room, was a cheese-room, in which were deposited 800 cheeses of 22 lb. each, all made of skim milk, and very inferior in quality.

On the left of the entrance-door stands the churn, holding about 140 gallons, turned by a mill with a horse from the outside. All the refuse runs through a wooden channel into a trough in the pig-shed, where there were about sixty pigs fattening. Next was the dairy barn, 60 feet long, 28 broad, and 30

feet high, in which stood some English sheep, deer, and a growing stock of young pigs, of the English breed.

The mansion-house is not modern, but very handsome and commodious, 104 feet long, 44 deep, and 40 feet high, and excellent vaulted wine cellars below. Spacious gardens, hot-houses, melon-beds, &c.

The poultry-yard is well stocked; 105 geese, as many turkeys, and other poultry in proportion. The fowl-houses are regularly sparred, about sixteen inches above each other, angling to keep the soil from the lower tiers. In a small room behind were the nests, which were a foot in diameter, and a foot above the ground, and the last laid egg was always left in the nest. This department was in charge of an old woman and boy, and was kept remarkably clean. There was an egg table, with three tier of holes for different eggs, and their dates. The house-keeper had packed a cask with fourteen dozen, in fine ashes, that day for winter use; peacock, turkey, geese, duck, and hen eggs.

12th August. At 5 A. M., walking toward the dairy, I saw ten women employed plucking the fine feathers or down off the breast and upper part of the loins of the geese, with which they filled two large tubs.

The following is the process of the dairy:—In summer one servant rises at 2 A. M. to make fires; the others half an hour later. They skim the cream, and run it through a sieve into the churn; the skim-milk is then thrown into a large tub to make cheese; they then wash the tubs. They have half an hour to sort themselves, and then proceed to the field to milk the cows. Every female has twenty cows to milk; and when her pail is full, which holds about nine gallons, it is emptied into a larger one of twenty-five gallons, which is hooked to a cart that carries it down to the dairy. The milk is then put through a sieve into the tubs holding two gallons each. These large milk buckets, twenty-eight in number, are then washed, and put out to dry, ready for next milking. The churn is broader at the bottom than above, and five of the staves project inward about three inches; the churn-staff works in a socket with an iron spindle. When the butter is churned, it is carried into the butter cellar, and put into a trough of solid wood, with holes in the bottom, where it is wrought a considerable time to work out the

milk ; after which it is salted, and lies several hours, then it is sprinkled over with salt again, wrought with the hands, and lies again twenty-four hours, when it is put into the casks.

This process is finished about eight o'clock, when the servants go to breakfast, after which they wash and clean the house, and assist in the garden till noon, when they dine, and rest till two o'clock, when they continue the same operations as in the morning.—On Saturday and Sunday they have from eight till two o'clock to themselves.

In winter the same operations go on, with this difference, the cows are kept in the house, and as they do not require so much attendance, the females spin all the wool and flax used for the house and dairy.

A book is kept of every cow's name and number, and the quantity of milk produced from each cow, which is marked four different times in summer, and the calves of the best are kept for the increase of stock, which at present consists of about 240, besides those not giving milk ; forty-one young ones in sheds, one and two years old, and two English bulls.

There are twenty-six farm and six carriage horses (mares), two breeding mares, thirteen young one to two and three years old, and the stallions Goliah and Sampson, which Mr Hirschfield has jointly with his brothers and others. In Holstein there are thirteen English stallions, and in Sleswick sixteen, besides the Duke of Austenberg's stud, which is the best in this country, where they are making every exertion to improve the breed of horses and cattle.

The produce of this farm in grain :—Rape-seed, 300 qrs. ; wheat and rye, 400 qrs. ; barley, 350 qrs. ; oats, 1000 qrs. ; potatoes, 700 qrs. ; turnips, 700 qrs. ; hay, 600 cart loads ; buckwheat, 100 qrs. ; peas, 90 qrs. ; butter, 27,320 lb. (English) ; cheese, 34,239 lb. (English). Average of each cow, 126 lb. butter, and 159 lb. cheese. The butter is sent to England, and sells from L.4, 10s. to L.5⁶ per cask of 100 lb., on which is a duty of L.1.

A number of pigs are reared annually from the whey and sour-milk, the pork salted and sold to the Hamburg merchants.

Visited Mr Hirschfield's brother, and met with a very kind reception. Walked through the gardens, and had a very interesting view of Rendsburgh on the river Eider, which leads to

the North Sea. About half a mile distant from where we stood is the entrance of the canal which unites the North and East Sea.

13th August. Drove through Mr H.'s wood, about 150 acres of fine young oak, beech, &c. Returned through Osterred, belonging to an English lady, the widow of a Russian merchant. There are 320 cows on the estate, besides other stock. The estate is let to a farmer, who has sublet the dairy to another person, who pays fourteen dollars for each cow, about L.1, 16s. annually; they belong to the estate, and must be returned in number and quality at the end of the lease, which is nine years.

Drove about four miles further east to Mr W. Hirschfeld's estate, Grossnordzee. We walked through very extensive gardens in which were large hot-houses, a hop plantation, and 10,000 fruit trees, all raised from the seed of 1833-4; each had a pole about seven feet high, and as clean and regular as possible.

There is also a small brandy distillery on this estate, chiefly from potatoes, barley, rye, &c.

There were 180 cows in the byre, and seventy fine oxen fattening for the knife, and a number of young stock.

At 10 returned home, after a most pleasant day's ride. My host, Mr Gustave Hirschfeld, is one of the most accomplished, mild, and gentlemanly persons I have ever met with; he had travelled through Germany, Switzerland, France, Italy, and Poland. Mr H. speaks very fair English. His wife is a daughter of my friend Mr Birch, who is a respectable merchant in Kiel; she is a pretty, agreeable, accomplished woman, worthy of her mother, who is a most amiable, delightful person.

Besides the domestic servants, there were two young men who acted as overseers, one of whom was so polite as to make out for me a plan of all the buildings on the farm.*

I cannot forbear mentioning here the neat manner in which the females of the dairy, twelve in number, are dressed, and so perfectly clean; a great contrast indeed to most of them in our own country. Their dress consists of a short-gown with full

* The author sent us the plan alluded to; but as the dimensions of all the principal buildings are given in the text, it is unnecessary to present a mere ground-plan of them.—EDITOR.

fashionable sleeves which do not nearly reach the elbow, a yellow, black and scarlet, linseywoolsey petticoat, blue stockings and sandals, and not a single hole to be seen in any of their stockings. Their hair is neatly braided under a low-crowned cap, and as smooth as possible, not a hair out of place. In the field when milking they wear straw-hats. The head dairy-maid might have gone to any assembly, she was so pretty, clean, and neat; yet she worked more than her appearance bespoke.

I was partly led to visit this farm from an idea I had formed in early life, that the inhabitants of this country were like the Russian vassals, who went in some measure along with the soil. I was delighted to find this was not the case, for whatever restraints were once on the people, they are now removed, for which they are greatly indebted to that amiable man the late Count Barnstoff, to whom an elegant pillar is erected in the neighbourhood of Copenhagen.

Mr Hirschfield informed me that, when studying at the Agricultural and Veterinary Academy at Möglin, in Prussia, they had 800 acres of ground, on which were 1000 sheep, for the students to practise on. They vaccinated 400 lambs in one year, and did not lose one, whereas on some neighbouring farms the whole flock was lost. The lambs in Prussia are vaccinated under the tail when about three months old, and fed coolly for some time. Mr H. afterwards went to the Agricultural and Forester Academy, Hohenheim, in Saxony, where they had 1000 sheep and 110 cows to practise upon.

The law of Denmark is, that every subject must be vaccinated, and a man cannot be confirmed nor married unless he carries a certificate of being vaccinated, and can read the Bible; nor can a soldier be enlisted without a certificate of vaccination.

14th August. The clergyman calling yesterday to pay his respects, induced me to inquire how the clergy were situated. I had the following answer:—The church is placed as near as possible to the centre of the parishes; the clergyman has a salary of 2000 rixd., about L. 130, per annum. The proprietors are the patrons, and take the management of the affairs ultimately; the clergyman is secretary. When a vacancy occurs, the patrons each present a candidate, and all the candidates preach on the same day before the inhabitants. The election is managed by one of the four patrons collecting the inhabitants of their re-

spective districts, the majority of whom makes one head voice or vote. Every farmer has a vote, and agriculturists and farm-servants have each half a vote; artificers of every description have a vote. The patrons have each eight votes, but they are the last to give them, that the people may not be in the least biassed. In the event of the votes being equal, the proprietor of another estate is called in, and he has the casting vote.

In Holstein there are three insurance offices. In the first, all buildings on the properties and in the villages are covered, and the trades-people and poor may have their moveables included at a fair valuation. In the second office, all the grain thrashed or unthrashed, implements of husbandry, and live-stock, may be covered. In the third office, all the growing grain of the estates and small farmers, under a guarantee of the proprietor, may be covered. After a heavy fall of hail, the surveyors examine the crops and make their report; they also examine them again fourteen days before harvest. The proprietors and farmers are themselves managers of these insurance offices.*

ON CROSSING THE SHORT-HORN WITH OTHER CATTLE.

By MR JAMES DICKSON, Cattle-Dealer, Edinburgh.

I SHALL now adduce numerous instances of improvement in breeding, by crossing the short-horn bull with the cows of other breeds, in order to shew the value of the short-horn bull as an improver of breeds.

1st, *The Cross of Short-horned Bulls with Shetland Cows.*—I have seen several specimens of this cross, which, with common feeding, have attained the weight of forty-five stones, and of rare quality, commanding the highest price in the market. The fine quality of the Shetland beef is not deteriorated by the cross, while the weight, symmetry, and substance, are much increased and improved. The most remarkable instance of this cross I am acquainted with, was an ox out of a cow weighing only about eighteen stones, and when thick-fat was one of the handsomest and completest animals I ever saw of any breed. He was bred and fed by Mr Baillie of Jerviswood: I purchased him when

* There are other interesting and amusing subjects treated of in the Journal, but which do not come within the province of this work.—EDITOR.

three years old, at Earlstoun fair, for L.25, and after feeding him one year on ordinary food, sold him, at four years old, to Mr Thomas Taylor, flesher in Edinburgh, for L.40 ; and when slaughtered he weighed upwards of eighty stones. He was considered by judges as the finest animal, in point of quality, ever slaughtered in Edinburgh ; and that an ox out of so small a cow should attain to the weight of ten cwt. with common feeding—for he got no extraordinary kind of food—should certainly surprise any who had not either tried or had seen the experiment tried. This is altogether a commendable cross, for its value is comparatively great to the original breed, and it is hardy and easily kept ; and its prime quality will always ensure a ready and high market for the produce. Another remarkable instance of the superiority of this cross was produced by Mr Dudgeon of Spylaw, at the Highland Society's Show at Kelso, in 1882. This instance consisted of two heifers, prime fat, and of first-rate quality, and they were much admired by every body who saw them. Their portraits were drawn by Mr Shiel, S. A. an artist of first-rate excellence as a painter of domestic animals. His qualifications for the art are founded on a knowledge which we suspect few artists will condescend to acquire,—a thorough knowledge of the points of animals. He is, in fact, a first-rate judge of stock, and, knowing the points which peculiarly characterize the different breeds, he cannot fail, as an artist, to produce portraits which are not only good pictures, but which exhibit those points which judges delight to appreciate. Mrs Boswell of Blackadder, Berwickshire, has a small Shetland cow which has produced an ox of 70 st. and a heifer of 60 st., both fine animals.

The Shetland breed might be made a valuable means of improving the breed which inhabit our upper mountainous regions. I would recommend a cross with it, which has never been perhaps tried at all, or, at all events, has never been known in our markets. As I have already described, the West Highlanders are remarkable for many valuable points, such as thick coats of hair, hardy constitutions, fine symmetry, aptitude to fatten, and of great substance. In these points they are much superior to the Shetlanders, which chiefly possess one superiority,—fine quality of beef. Now, were a cross instituted between first-rate West Highland bulls and Shetland cows, a breed

would be produced possessing points much superior to the Shetlanders, and superior to the West Highlanders in quality of beef. Such a cross would be admirably adapted to fill the place which is at present occupied by what is called the North Highland breed. After the establishment of this cross, which would be valuable for the higher districts, it might be still farther improved and adapted to the lower districts, by crossing with first-rate short-horn bulls. I have no doubt that this improved cross would exhibit cattle with proportions and qualities superior to any breed at present in existence. It would possess the fine quality of the Shetland beef, with the hardy constitution and shaggy coat of the West Highlander, conjoined with the size, substance, great aptitude to fatten, fine symmetry, rich colours, and beauty of the short-horn. This improved cross, with all these valuable properties, would ensure the highest price in any market.

I am aware that many breeders, and breeders too who are favourable to crossing, would condemn the pursuance of a second or more crosses; because they injudiciously believe that every cross after the first must deteriorate. I am of an opposite opinion. I believe that crossing cannot be too far promoted, provided the male parent possesses that high tone of blood which I have attempted to describe in former papers, and which it is necessary to preserve to maintain judicious crossing. There is a judicious, and there is an injudicious mode of crossing. If the males of the first or subsequent crosses are kept for bulls, then the cross obtained from these bulls will be highly injudicious, and the deterioration in the breed which the breeders alluded to dread from all crossing after the first, will certainly be realised; but were bulls only of the best blood always used to promote a cross, the cross will certainly be an improved animal.

2d, The Cross of Short-horned Bulls with North Highland Cows.—This cross would certainly improve the breed of this part of the country; and although the native stock is not so favourable for the experiment as that of Shetland, owing to the great inferiority of the quality of the breed, still the cross, like all crosses in the same way, would be much better for feeders than the native cattle; and were the same done in the northern counties to raise a few turnips, the cattle

surely acquired by the cross would commend them favourably to dealers and feeders. Mr Darling, manager for Mr Horne of Stirkoke, about twelve years ago, purchased a short-horn bull bred by the late Mr Thomson of Laws, in Berwickshire, for the very purpose of crossing with the native breed. By such a proceeding, in the course of time the whole cattle in the district would generally assume an improved aspect. Mr Darling's experience will prove this. He has sold three-year-olds of this cross at nearly double the price of his neighbours, who still persist in keeping the native breed. Of late years, Mr John Wilson of Simprim, has supplied Mr Darling with short-horn bulls; and to shew the value which Mr Wilson puts on this cross, he has purchased the three-year olds from Mr Darling, and fed them another year in Berwickshire. Of these he has shewn some extraordinary animals, and particularly a lot of twenty-six at the June fair at Dunse in 1836, which fetched nearly L.25, and would have averaged about seventy stones each. They were afterwards shipped at Leith for Smithfield, where they were considered the best beasts in the market of the day.

Much of the land in Sutherland and Ross shires could support short-horns; but the cross, I conceive, would be more commendable, not only as being hardier, but that part of the country being far from the fat market, it would be better adapted to travelling to the south country markets than short-horns. What noble cattle, both stots and queys, would not the cross with Dunrobins make! They are naturally fine cattle, particularly upon such pasture as at Dunrobin, but they would certainly be improved in substance, and be more profitable by crossing.

3d, The Cross of Short-horned Bulls with Aberdeenshire Cows.—Both the Buchan doddies and the large-horned Aberdeenshire breed are well adapted for crossing with the short-horn. Their rougher points and plain skins would be smoothed down and ameliorated. When attending the cattle show at Castle Haugh, near Old Deer, one season, I recommended to breeders to try the cross, and I was happy to hear that some trials had already been made in that way, and successfully. Lord Cintore shewed an extraordinary ox at the Highland Society's show at Aberdeen in 1834, a cross with a large horned Aberdeenshire cow and which obtained the first prize for fat, sym-

metry, and weight. He was sent to London to the Christmas Show of the Smithfield Club in 1833, and was brought back again to Aberdeenshire, with the view, no doubt, of being shewn at Aberdeen. He was seven years and six months old, of extraordinary fatness on most of the best points, and scarcely able to walk. He was sold for L.100, and slaughtered a few days after the show by Mr Roger, Aberdeen. His live-weight was 224 stones; dead-weight 173 stones 4 lb. His tallow was only 16 st. 7 lb.; hide 8 st. 3 lb. which was a small weight for an ox which girthed 10 feet 3 inches; entrails 126 lb.; blood 84 lb.; head and feet 64 lb.; heart and liver 43 lb.; tongue 14 lb.; and kidney collop 5 lb.

Mr Boswell of Kingcausie shewed a three-year-old cross at the same show. He was, without exception, one of the most perfect oxen ever seen. His general symmetry was beautiful, the points all prominent and well covered, and in the highest hard-fat condition. He was slaughtered by Messrs Reid and Sparks, Aberdeen. His dead-weight was 89 stones 10 lb., hide 6 stones 2 lb., and tallow 14 stones 4 lb. One of four oxen shewn by Messrs Reid and Sparks, Aberdeen, was a cross, and although a year younger than the rest, he was not much less in weight. I once saw a lot of crosses, about fifteen, shipping at Aberdeen for London, which would weigh about 65 stones, and had been sold for L.20 a-piece.

Aberdeenshire is admirably circumstanced for carrying on the crossing system. Naturally possessing a breed of strong characters, generally inclining to coarseness, the cross would fine down the asperities, induce a disposition to early maturity, and improve the weight and quality of the carcass, while the convenience of steam navigation invites to the advantages of the London market. This county is in the vicinity of Captain Barclay's stock, from which could be supplied bulls of pure blood and sure pedigrees, which had been bred and inured to the climate of that part of the country; and this is an advantage of no mean consideration for breeders. Indeed, crossing is now pursued with ardour in this county. Captain Barclay, who was not long ago under the necessity of disposing of his young bulls in Edinburgh, can now find a ready market for them in the county at high prices; and this year, although he had a la

lot of bull calves, which sold at high prices, averaging L.37, 10s. each, the breeders could not be supplied, but were obliged to import young bulls from the Border.

4th, The Cross of Short-horn Bulls with Angus Cows.—

This cross has been much attempted, and attended with complete success. Mr Anderson of Balunie pursues this system, and Mr Hood of the Hatton of Eassie, has shewn some very superior stock of this kind. About three years ago, he shewed a lot of ten three-year-olds, some of which were crosses and pure Angus. They were sold for L.17, 10s. a-head, as prices were then rather dull; but what induces me to notice this lot particularly is, that the crosses were fully 8 stones each heavier than the Angus, and worth L.3 a-head more. I saw some superior cows at Mr Hood's, which were of the second and third crosses with short-horn bulls, which I much admired, shewing good symmetry and fine coats of hair, and in very high condition for breeding cows, some of them being 60 stones, and fit for the butcher. Before Mr Stephens got into the pure stock of short-horns at Balmadies, he pursued the crossing with Angus cows. The cross queys and stots were fed off at three years old, and though prices were at that time very dull, they were sold from L.17 to L.23 a-piece, some of them above 80 stones. As a proof of extraordinary growth in a cross, he purchased a two-year-old stot from a tenant for L.6. It had been more than half starved all its days, and was exceedingly lean, but it exhibited good bone, and a loose kindly skin. It was grazed and fed next summer and winter, and sold in April after, just a year after it was bought, weighing about 70 stones for L.17, 17s. He sold a pair of roaned polled queys (twins), at three years old, at 70 stones each. They were so like each other, that few people could recognise the difference; and when slaughtered by Mr Walter Maclean, flesher, Forfar, more perfectly ripe animals of their kind could not be found. Many people kept cross queys for cows, which turned out uncommon milkers. Mr Stephens also tried the second and third crosses, and found them superior to the first. Mr John Wilson of Edington wains, in Berwickshire, a short-horn breeder, has adopted a system of crossing with Angus queys which has hitherto proved successful. He purchases every year a lot of two-year-old

Angus heifers at June Trinity-Muir market, at Brechin, in Forfarshire, for L.5 or L.6 a-piece, which are laid on to coarse-land grass with a short-horn bull. They are wintered in the straw-yard on straw and turnip tops, and bear calves the following spring, which they suckle. They are grazed on the same kind of land the following summer, till about August, when the calves are weaned, and both cows and calves are put on the best keep. The cows are fed the following winter, and generally realize L.12 or L.13 a-piece. The calves are fully fed in winter and summer, and sold at twenty-four months old, when they are worth, on an average, L.16 a-piece. In 1836, the price realized for such was L.20 a-piece. This plan is abundantly profitable for those who have some coarse pasture on their farm. The grazing on it is not costly, and the turnip tops, which would be thrown away on feeding beasts, are consumed and become useful to the queys in calf in winter. The calf, when weaned, is worth nearly as much money as the cost of the keep of the cow till that time; and there are L.6 or L.7 left for feeding her six or seven months, besides the saving of the trouble of keeping the cows, and milking them, and feeding the calves by hand. All the stock continues quite healthy. This is a system well worthy of imitation by breeders, particularly by breeders in Angus and the northern counties, who have land adapted for it. Mr John Wilson of Cockburn, in Berwickshire, also pursues the same system of crossing. He sold a lot of this cross in March 1836, rising two-year-olds, at L.16, 10s. each, averaging about 52 stones. Mr Wilson also tries the second cross, the calves of which are much superior to those of the first cross. Here is another instance of pushing the cross beyond the first attempt with advantage. Mr Robert Blackadder, Ninewell Mains, in Berwickshire, keeps a regular stock of Angus cows, from which he rears a cross of a most excellent kind.

5th, The Cross of Short-horn Bulls with Fife Cows. — I understand that some breeders in Fife, among the rest Messrs Thomson of Pusk and Rathillet have excellent crosses, but as I am not sufficiently acquainted with the facts I cannot detail them. The Fife breed are well adapted to cross with; their gaunty figure would be improved, and their disposition to fatten would be greatly increased. Fife has great inducements

for the improvement of her cattle. The Edinburgh fat market is quite at hand; and that at Glasgow is not farther off than is Morpeth from the breeders on Tweedside; and when steam-vessels can be found both at Leith and Dundee, the London market is also thus brought within the reach of every one in the county. But before the Fife breed of cattle realize the top price at Smithfield, and pay the expenses of conveyance by steam, it will require to be considerably ameliorated in its rougher points, and no treatment could effect this amelioration more speedily and effectually than crossing.

6th, The Cross of Short-horn Bulls with West Highland Cows.—I have already said that the West Highlanders approach in external characters nearer to the short-horns than any other native breed; indeed, in regard to form and substance, they are just short-horns in miniature. This cross has been frequently tried by Lowland breeders, and succeeded admirably. I should not recommend the cross to be universally introduced into the Western Highlands and islands; because, from the wetness of the climate in many parts, the shaggy coats and hardy constitutions of the pure breed are alone able to defend them from its effects. The Isle of Skye, for instance, which possesses the native breed in uncontaminated purity, could not be better appropriated than it is at present in raising the pure breed for the supply of other parts of the country. But there are many parts of the Western Highlands which might be more profitably to the tenants, and of course through them to the proprietors, occupied with this cross. Few crosses exceed this in beauty and value; and under less favourable circumstances, as inferior land and inferior herbage, none is more profitable. I shall mention a fact or two to shew the superiority of the cross over the pure breed. I purchased twenty West Highland heifers at Dumbarton fair for L. 4, 12s. a-head, and put a short-horn bull among them. This bull proving defective, another was put, a white one by Diamond, out of the roan cow Darnly, bred by Mr Compton of Annam. Having thus been served late in the season, the heifers did not calve till the beginning of July in the following year. Being all roan, Mr David Skirving of Garleton in East Lothian, took a fancy to them and bought them in the following spring for L. 7 a-piece. Having in his possession at the

time two dun West Highland stots, the dams of which were purchased from Mr Peter M'Intyre of Glenartney, on the Drummond estate, as already mentioned, when treating of West Highland cattle, Mr Skirving thought of trying an experiment on the comparative feeding powers of crosses and pure breeds. He accordingly selected two of the crosses, then en months old, to experiment with the two West Highlanders, which were at the same time twenty-four months old. The latter had thus a start of fourteen months in the age, and they were forty stones a-piece, while the former were perhaps not half that weight. The four stots were fed together rather more than two years and a half, when they were shewn at the Highland Society's Show in 1827. To prove that the West Highlanders were superior of their kind, they obtained the premium for that class; but one of the crosses obtained the premium in the class shewing the most fat, symmetry, and weight of any age and breed. This ox was only three years and four months old, and he beat six or seven others which were not less than five years old. He was considered by the judges, and all who saw him, to be the most perfect animal of his age ever shewn in Edinburgh. The four oxen were purchased by Mr Thomas Taylor, flesher in Edinburgh, for L. 170. The two crosses were resold before they left the show-yard to Messrs Duncan and Cowan, fleshers in Glasgow, for L. 100. When slaughtered the West Highlanders were both nearly of one weight, 74 stones each, and had 12½ stones tallow; the crosses were, one 82½ stones, the other 77½ stones; average 80 stones, and 14 stones of tallow each; thus yielding 6 stones of beef and 1½ stone of tallow each more, and fourteen months younger than the pure breed. Mr B'rodie of Northfield tried this crossing, about fifteen years ago, and realized L. 15 and L. 16 a-piece for two-year-olds, though they had sucked their dams on Coldingham Common, on the Lammermoor Hills, on very coarse land. His successor on the farm, Mr Alexander Heriot, follows the same system, and shews excellent fat beasts at two years old, and obtains the highest market price for them. Mr Bates, late of Halton Castle, an eminent breeder, pursued this system with success. Mr John Blackadder, Blanerne, East-side, Berwickshire, has pursued the same cross for ten years, with great success.

7th, The Cross of Short-horn Bulls with Ayrshire Cows.—Comparatively few oxen being brought up to slaughter, and this having established itself as a decided dairy breed in Ayrshire, I would not recommend their being crossed at all. In other situations, however, where gentlemen choose to have their dairies supplied from Ayrshire cows, their cross progeny might be fed off, and the cow stock replenished direct from Ayrshire more profitably than by breeding them on the spot.

8th, The Cross of Short-horn Bulls with Irish Cows.—Many people imagine that all the Irish cattle are coarse, but they are mistaken. Most of those, indeed, which are brought from the north of Ireland, are coarse enough, and very inferior in shapes, points, and quality; but the cattle from the southern and midland counties of Ireland are excellent, and will feed to great weights. They would be, no doubt, much improved by crossing, and for that purpose I understand many short-horn bulls have been imported into that country, in order to suit their fattening disposition for the English markets, which are now the great marts for the sale of their cattle. I have seen as well-fed beef in the Smithfield market of Dublin as in that of London. I once saw in Dublin a lot of four-year-old cross heifers from a bull from the stock of the late Mr Alexander Thomson of Laws in Berwickshire, out of Irish cows. It was a very superior lot of cattle; and sold for L.26 a-head. I saw them slaughtered, and their average weight was 80 stones, some of them 90 stones. The beef was of very fine quality, and thick upon the sirloins and backs. There were other lots of crosses in the market, and the butchers and dealers seemed to like the crosses very well.

9th, The Cross of Short-horn Bulls with Guernsey Cows.

One of this cross from the stock of Sir John Hepburn of Dalkeith, in East Lothian, came into the possession of Mr James Dalrymple of Spittalrig, in the same county, which was kept for a year, and became a very fine animal. I saw him when fat, and he was, without exception, the fattest bull I ever handled. He was sold for the purpose of affals, and sold for twenty guineas, and when slaughtered in Edinburgh, the four quarters weighed 104 stones, and the tallow 22 stones.

10th, The Cross of Short-horn Bulls with Indian Cows.—

A heifer of this cross belonging to Sir Anthony Maitland, was shewn at the Highland Society's Show at Kelso in 1832, and was admired by every one for its fatness and extreme beauty, the back and sirloins being well covered with beef. It was afterwards slaughtered in Edinburgh by Mr James Shaw.

11th, *The Cross of Short-horn Bulls with Galloway Cows.*—The remarks which I have made on the cross with the Angus and Buchan doddies, will apply to that with Galloway cows.

The facts which I have adduced in regard to the results of crossing unquestionably prove that, in all situations where the pure bred short-horns cannot be most profitably maintained, such as in the upland districts, and coarse pasturage on inferior soils in the lowland districts, the cross between the pure bred short-horn bull, and the cow of any native breed, will yield more profit to the breeder than the continuation in the cultivation of the native breeds. There are one or two exceptions which I would make to this general recommendation; but before these exceptions, and the working of the general system recommended, can be fully understood, a few preliminary remarks are requisite.

In the first place, when we look at the general features of this country (Scotland) all the pasture may be classed into three great subdivisions, viz. the highest or natural heathy pasture; the middling or natural green pasture; and the lowest or the artificial pasture of the plains. These three kinds of pasture are situate on different geological formations. The heathy natural pasture is situate on the primitive rocks or formation; the natural green pasture on the transition or secondary formation; and the artificial grass of the plain is situate on the alluvial or tertiary formation. Now these three different situations for food are suitable to three different breeds of cattle having properties and habits and constitution in conformity with the respective situations. As we have taken a review of all the principal breeds of cattle in this country, we are enabled to indicate what breed or breeds should be placed in these different situations. Reason teaches us it would be improper to place a large breed on high scanty herbage. The uppermost or heathy pasture is generally scanty, and can only be plentiful for a few months in summer. We have seen that

small, black-coloured, hardy breeds exist in the north of Scotland, commonly called North Highlanders. Shetland, Island of Lewis, and Ross-shire present such cattle, and on examining them we have found that the small Ross-shire cattle possess points nearest to the rule which we have explained, by which, to judge of the good or bad properties of cattle ; and they are sufficiently hardy in their constitution for the situation. But the best race of cattle for the upper region I conceive would be the cross between the West Highland bull and the Shetland cow, as recommended above. In winter when these elevated pastures are covered with snow, the cattle must of course be brought down to a lower situation, and cared for as all other cattle are, for it is only in summer that the natural heathy pastures are generally available to cattle in Scotland.

The natural green pastures, at a less elevation than the former, can be used for the greater part of the year, their greenness arising from warmth and humidity, both encouragements to vegetation. We have seen, that of all the breeds of cattle which frequent these green pastures, there is not one comparable in good points to the West Highlanders. Their shaggy coats, and hardy constitutions, are quite suited to the elevation and humidity of these green pastures. The West Highlanders have not yet found their way to the green natural pastures of the east coast, where the small-horned brae cattle occupy the same region as the former do on the west coast. But, in point of quality, there is no comparison between the two breeds. The east coast having a drier climate than the west, the West Highlanders might perhaps lose a little of the shagginess of their coats by a transplantation to the east coast ; but there cannot be a doubt that, in hardiness of constitution, they could withstand the test with the brae cattle, while their other points of superiority would ensure greater profit to the breeder.

The plains could support pure short-horns, if they were reared and fed on their respective plains or situations. They would thrive as well in Caithness, Cromarty, Buchan, Kincardine, Angus, Fife, and Galloway, as in East-Lothian and the Border counties, and be much more profitable to the breeder than any of the breeds of the plain at present in existence. I cannot go farther than has already been given of the feeding

properties of short-horns, is requisite to establish this point. Like the multiplicity in the varieties of the potato, there are too many varieties of breeds of cattle in this country. Were those only which are proved to be most profitable cultivated and encouraged, the agricultural interest would never feel so severely the depression in the prices of corn ; nor in that case need breeders be under any apprehension of a foreign competition, even were the importation of foreign meat permitted duty free. Could I have my desire fulfilled, I should have only the three breeds which I have recommended for their respective situations throughout the whole country, namely, the cross recommended between the West Highland and Shetland for the upper pastures, the West Highlanders or Kyloes for the middle pastures, and the short-horn for the plains, for purposes of feeding ; and the Ayrshire might continue as they are, or rather as they might be improved by judicious cultivation for the purposes of the dairy, although I am not of the opinion that the Ayrshire make the best dairy cows. Could such a desideratum be consummated, breeders would then derive the greatest profit from their pastures with the least exertion, and they could always depend on their cattle acquiring the greatest weight in a given time on a given quantity of food, and this invariable result would stimulate their exertions to raise a greater quantity of food. Indeed, the ability of the ground to produce the largest quantity of animal food could then only be the limit to the greatest profit. What, then, would be the degree of perfection which our agriculture would attain, for it is only by the extension and improvement of live-stock that the fertility of land can not only be maintained, but increased !

The accomplishment of such a wish as I have expressed, namely, that only the breeds of cattle were cultivated which I have recommended, may be improbable, but it is not impossible. Were all breeders imbued with a sense of the importance of such an arrangement, the result could be attained in the course of a few years. Indeed, were plans simultaneously adopted for the attainment of this desirable end in different parts of the country, the enlarging circles of improvement would meet in their circumference much sooner than most people might anticipate. It

might, in short, be done by a system of *judicious crossing*; and to the elucidation of this subject I shall now direct the attention of the breeder.

I am well aware that many breeders object to crossing at all. They conceive that it is much better to allow the breeds to remain as they are without mixture, than to introduce numerous mongrel races, the origin of which it would be ultimately impossible to trace. I object to promiscuous crossing as much as any man. It is to this injudicious system that may be traced the existence of so many miserable breeds of cattle in the country. Any one who takes a leisurely survey of the breeds in Scotland through the midland and northern counties must be satisfied, that many of them are inferior to the best kinds, and that to cultivate them is just to bestow labour on that which is unprofitable. It is surely not sufficient for a farmer that he has merely a lot of cattle so called, to trample down his straw and eat his turnips, regardless of the return in flesh which these cattle may give for the meat which they consume, and the care which they require. It is requisite that these cattle leave an adequate profit, otherwise how can the farmer pretend to disburse the rent which he has undertaken to pay? Can he expect the same market price for an inferior kind of wheat and barley which he may obstinately choose to cultivate, instead of the ordinary and superior kinds which are in every farmer's hands? If not, by a parity of reasoning, how can he expect the highest market price for the rubbish of cattle which he pertinaciously perseveres in breeding or purchasing? Were cattle of no better quality to be obtained in the country, a reasonable excuse might be urged for such negligent management; but when more profitable, nay the most profitable stock can be obtained, what reasonable excuse can be tendered for the cultivation of inferior descriptions? It is true that the best breeds of cattle could not be obtained to supply a general and simultaneous demand; but, were a general demand expressed for them, breeders would not be awanting the necessary supply.

I cannot too frequently or too earnestly urge breeders to cultivate only the best breeds of cattle. Look around the country and see the numbers of sharp-backed, flat-ribbed, and coarse-boned beasts which are every where to be seen. Such cattle

have very appropriately been termed "*razor-backs*." These razor-backs, after they have devoured more good food than the better sorts, present nothing but masses of coarse beef. There is not a joint of meat in them to suit the customers of respectable butchers. Besides, when they are brought, say to Smithfield, to be sold, instead of drawing 4s. 6d. or 5s. the Smithfield stone, they are bought only by butchers who take on low contracts at probably not more than 2s. 6d. or 3s. per stone. Here, then, is a decided loss of 2s. per stone, besides having fewer stones to dispose of. This loss, it is evident, arises from breeding and feeding a bad breed, for it is impossible to feed these razor-backs with any quantity of food, and of any quality. Now, is this not a grievous loss which these breeders inflict upon themselves? and the disappointment which they incur to butchers is not less grievous. These breeders stand all day without a customer in a declining market, and have to return home with their despised cattle, or dispose them at a decided loss at the end of the market; and even in a brisk market they will be the last to be sold, and when sold they will only be purchased by unwilling butchers at reduced prices. Should such cattle return any profit at all, it will be to the dealer and not to the breeder. The dealer may buy them at a low price in a dull, and sell them at a profit at another time in a brisk market. Such chances do sometimes happen, but they are neither safe for the buyer nor the seller. On the other hand, good beasts will improve in value as they improve in condition—and improvement of condition is a certain result on good food. But after having sold his razor-backs the breeder is probably a decided loser on them at the highest price which they can fetch. How often do we see coarse yearlings and six-quarter old cattle sold for 20s., 30s., and 40s. a-piece. Now the calf was worth 5s. to start with, and a calf cannot be kept alive on milk at less than 2s. 6d. per week, which, at the end of ten weeks, is 25s.; and if the calf be even *then* sold, the whole keep will be lost; but should it be kept till it is six-quarters old and sold for 40s., this is only 10s. for eighteen months' keep, however miserable the keep may have been. Can rent be paid under such wretched management? But if the rent is not paid, and the trouble only repaid, the object of the tenant in entering into the covenants of a lease with his landlord is of course

trated. How liberally soever the landlord may be disposed to act towards his tenant, yet, under such circumstances, his liberality would be abused, for the tenant has it in his power to cultivate a profitable stock, which would enable him to pay the rent which he had agreed to pay.

It is obviously the interest of the landlord to compel the cultivation of the best breeds on his property, by the power which he possesses in forming the clauses of the lease. He may insert whatever condition he pleases in the lease, provided it is not contrary to the rules of good husbandry, and it is in the free option of the tenant to accept or reject that condition. If one tenant reject it another will accept it; and in this manner, under a general system, the tenants would be compelled to attend to the general interests of the country, by attending in the first instance to his own and the landlord's interests. The interest of landlord, tenant, and the country are thus inseparably bound up together. But it is a matter of regret that too many landlords attend more to the mere reception of the rent, than to the improving condition of their estates. Many live abroad; others are constantly employed in the gaities of a metropolis, while some only pay an occasional visit to their paternal homes. Such a course of conduct would be well, provided it did not injure the best and most vital interest of the country, namely, the Agricultural. It is dangerous no doubt to prescribe in the least degree how a man ought to spend his income; but I conceive that a landed proprietor has as little right to injure the interests of the State, by neglecting the progressive improvement of his estate, as the tenant to injure the same interests, by perseverance in the cultivation of a profitless breed of cattle. Both are drones in the national hive of industry. It is true most large proprietors have resident factors or agents on their estates, even though they themselves should be resident. Most of these factors, when they have been regularly bred to the agricultural profession, perform their duties in a becoming manner; but too many of them are lawyers, who cannot possibly know farm management, and whose appointment has most probably been recommended from only a knowledge of the subtleties of law; and most of such factors only visit the tenantry on rent-days.

The objectors to crossing recommend the maintenance of the

purity of every breed, whatever pretensions that breed may have; and should a better be desired to be introduced into any particular part of the country from another quarter, instead of improving the existing breed by crossing, they recommend the transplanting of the desired breed to the situation unsuited, perhaps, to its habits and constitution. Such a horror have they at crossing, that they would transplant an existing breed rather than cross at all. Now I have stated that I would introduce the best breeds to the situations suited to their habits and constitution; and for this reason have recommended the new cross to the highest, the West Highland kyloes for the middling, and the short-horns for the pastures of the plains. It might be possible by degrees to institute the two former breeds in their respective situations by transplanting them bodily; but I conceive that the vast herds of the plains could never be substituted by short-horns by the process of transplantation. Were this slow process attempted as a general measure, the substitution could not be realized during many generations of men, instead of generations of animals. A sufficient number of short-horns could not be obtained from the districts in which they are bred for that period of time, and at the same time the natural demands of these districts be maintained. But crossing could accomplish the object in a calculated period of time. Numbers of well bred short-horn bulls could be distributed over the districts among breeders; and as one bull can serve many cows, the very first year would produce many hundreds of crosses. More bulls could be obtained for the use of the rising female stock, and by such a procedure the country would soon be furnished by females for breeding from, while the cross males could be fattened and sold off at two years old, or at most three.

Many I know entertain a doubt of the possibility of continuing the crossing after the first attempt. They allow that the first cross between a well bred short-horn bull and a cow of any other breed is excellent. I have enumerated too many good instances of this cross to admit of doubt on that point; but I entertain no doubt whatever of the successful issue of a continuation in the cross in the subsequent generations for the obtaining of a good short-horn stock. For, in what other way than

by crossing was the present pure stock of short-horns obtained? The old Teeswater breed formed the basis upon which the pure short-horns were reared; but how reared? Not surely by any attempted refinement of the Teeswater breed itself,—for it was probably as good as could be; but by crossing them with the Holstein breed imported on purpose from Holland: and while attending to this subject in one of my former papers, we have reason to believe that not many generations of this cross had existed before the appearance of Hubback, the progenitor of the present race of short-horns. Having this palpable and well authenticated fact to revert to, what reasonable grounds have we to doubt that good short-horn bulls will establish good stock of that breed every where? Were only the best females of the breed intended to be changed selected, the conversion would sooner be realized; but, even under limited circumstances, with good bulls, the conversion would be effected in time. In this sort of crossing, it is to be observed, that a pure bred male is always employed to improve the progeny of the female.

There is yet another consideration which holds out an encouragement to crossing. A good female of the breed intended to be substituted, may be introduced to a good bull of the breed to be dispensed with; that is, a well-bred short-horn cow may be put to a bull of another breed, and the progeny will display an improvement in many points over the bull. I once saw a remarkable instance of this kind of crossing, which was successful, and which I shall relate. About twenty years ago, Mr Charles Heriot of Kelloe Mains, in Berwickshire, tried an experiment of crossing short-horn cows with a pure West Highland bull, of a dun colour, which he had purchased from Mr Campbell of Islay, an eminent breeder of kyloes. The produce were most excellent cattle. I was at a sale of Mr Heriot's stock some years after, when I saw about sixty of this cross sold. The four-year-olds fetched L. 30 a-piece, and they would have weighed 70 stones each. The three-year-olds L. 20 a-piece, and 55 stones in weight. He had a five-year-old ox of the same cross some time before, which he sold for L. 50, weighing 100 stones. I shall give one other instance of crossing different from this. Colonel O'Callaghan's bull, called "O'Callaghan's Son of Bolingbroke," was

got by Mr Charles Collings's bull Bolingbroke, out of a polled Galloway cow. This cow, and another of the same breed, were purchased of Mr David Smurthwaite, near Northallerton, by Mr George Costes, who sold them to Colonel O'Callaghan. O'Callaghan's Son of Bolingbroke, when a few days old, became the property of Mr Charles Collings, and was the sire of Grandson of Bolingbroke. O'Callaghan's Son and Grandson of Bolingbroke, were good bulls, and got good stock; and, indeed, had they not done so, they would not have been used by Mr C. Collings. Here, then, are instances of good stock in the one case out of short-horn cows by a kylie bull; and in the other by a short-horn bull out of a Galloway cow. These facts prove that crosses will succeed in any way, provided the animals crossed are good of their kind. But this species of what may be called wrong crossing, I would not recommend to be persevered in. Many mistakes have been made by less experienced breeders than Mr C. Collins in using a bull bred as O'Callaghan's Son of Bolingbroke was; many disappointments have occurred by pursuing so ambiguous a course. I call it ambiguous, because no one can foretell the nature of the progeny of such a cross; but the nature of the progeny of a well-bred short-horn bull, from a cow of any breed, can be easily foretold; it is sure to be *better* than the dam. In the case of the West Highland bull, it is to be observed that no two breeds of cattle approach in character so near one another as the kylie and short-horn; but still the other way of breeding, namely, the short-horn bull with the kylie cow, is to be preferred on account of the certainty of the result. This always makes a dashing cross, and good feeders. The aptitude to fatten of the short-horn, is combined with the shaggy coat and hardy constitution for exposed situations of the kylie. Any of the modes of crossing may do merely for feeding, but not for a breeding stock. Another important consideration is, that the cross of a short-horn bull never being equal to the sire, and the qualities of the sire being more impressed on the progeny than those of the dam, it is indubitable that the use of the short-horn bull may be confidently persevered in, till the progeny, in a succession of generations, shall become equal to the sire. This kind of crossing with the short-horn bull is what I mean by *judicious crossing*; and were this system generally pursued throughout

Scotland with the lowland black breeds of cattle, they would be in time transformed to good, useful short-horns, profitable alike to the breeder and the feeder. The generality of cattle could then be fed off at two years old, giving a quicker return of capital to the breeder.

Towards the accomplishment of this improved state of things, no confusion need be experienced. All that the breeder would require would be to secure the use of well-bred short-horn bulls, and to select the best females he has to put to him. Pursuing this course steadily, there is no danger of committing any serious mistakes. He must not permit himself to keep this calf or the other for a bull as long as his stock is only in an improving state. His time will be sufficiently occupied in rearing for breeding stock the best of his cross queys. He must curb his ambition to become a successful breeder of bulls, till he has acquired a stock of pure and high-toned blood.

There might be some danger of maintaining the purity of blood in a district after the improved stock had been generally established. The cupidity of some might impose inferior bulls upon the ignorance of others. It is in such circumstances that proprietors have it in their power to enhance the improvement of stock. Every large proprietor in the district might keep a stock of high bred short-horn cows, to breed bulls for the use of the tenants. Such bulls might be lent for some years, either to be used solely by one breeder, or conjointly with others, according as breeders had sufficient stocks to employ him; and they could be returned when they became aged, and exchanged among the tenantry as their progeny became nearly related to them in blood. Terms could be made in the leases of proprietors who thus bred bulls, to oblige the tenants to use their bulls, or none worse; and even small neighbouring proprietors, who would not conveniently become breeders themselves, might be accommodated with the use of bulls for their tenants, on condition of paying a sum for hire. In short, were the desire for possessing the most profitable stock generally expressed by the tenantry, means would soon be adopted by landlords and others to supply the demand. The sooner the tenantry express that desire the sooner will they reach that state of independence to which they are at present daily struggling.

ON THE AGRICULTURAL CONDITION OF WESTERN AUSTRALIA.

" The State and Position of Western Australia, commonly called the Swan River Settlement." By Captain Frederick Chidley Irwin, of H.M. 63d Regiment, late Commandant of the Troops, and acting Governor of the Colony. London, Simpkin & Co. Stationers' Court; and J. Cross, 18 Holborn. 1835.

WE briefly noticed in our 26th Number the letters and journals of George Fletcher Moore, Esq. now Advocate-General in the Swan River settlement; but having been favoured by a correspondent with an abstract of recently received letters from that gentleman (with some references to the published report of Major Irwin), we present it to our readers.

It appears that the market value of land has risen considerably, which is a fair indication of the corresponding prosperity of the colony. One gentleman now demands L. 50 a-year for the mere grazing of a tract which was originally purchased for that sum. Grants are for sale, at various prices, from L. 4500 to L. 200, according to the extent and local circumstances; yet advantageous bargains may be had by purchasers on the spot. It is a matter of regret that the government instruments for surveying are incorrect: there is not one perfectly true in the colony; no two compasses are in critical accordance, and, as a very trifling divergence of line makes a considerable difference in grants sometimes sixteen miles in length, it is evident that there is much room for disputes and litigation.

The soil on some of the hills in the interior has been ascertained to exceed in quality that in the plains, and is described as a red sandy loam, with natural lucerne and grass in tolerable abundance; and beyond those hills the climate is probably more moist, for it is stated by the natives that green grass is there throughout the summer, which is not the case in the plains, although it quickly vegetates after even the slightest degree of moisture.

The York district, which is to the east side of the Darling Range, and to which many of the settlers have gone, being comparatively good pasture land, is now devoted to the use of the sheep of the colony, which are stated to be in fine condition, though a Scotch shepherd has been unfavourably impressed

with regard to this district, on finding that the seeds of the spear-grass get into the wool, a circumstance which renders early shearing necessary there.

Horn cattle do well in this district, where they have ample range. Cows have fallen in value; but working bullocks keep up their price, as there have been many casualties among them, and no recent importations.

As a criterion of soil, it may be stated, that wherever the blue gum-tree grows, the soil is indifferent, but the red gum indicates loam of a superior quality. Mr Moore recently explored a considerable district, with the view of ascertaining the varieties of soil and productions, in company with Mr Drummond, the government botanist at Perth (brother to a writer on the Mosses of Scotland), and they found a shrub which Fraser and Baron Hugel had once seen in the colony in the bed of the Swan River—a species of *Hibiscus* with leaves like those of the Scotch fir, and flower like that of the gum-cistus. The capabilities of the soil and climate are now pretty well ascertained.

The seed-time lasts from the beginning of May to the end of August: showers begin to fall in March, and increase in quantity and duration until August; heavy rain generally falls in September, and occasional showers descend in the two following months. In December the grain is ripe.

The wheat is of superior quality, but the average produce per acre is small: it has been computed at twenty-five bushels the English acre; but the calculation has not been made with accuracy.

The report of the Western Australian Association strikes an average for the last harvest of twelve bushels per acre, accounting for this small produce by the fact, that *some* of the land sown with wheat was totally unfit for it, and wretchedly tilled into the bargain.

The following experiment, as detailed by Major Irwin, proves that good crops are occasionally produced.

Two acres of land, and, measured with exactness, and sown with wheat, produced in the year 1835, at the rate of forty-three bushels, and the second year, at the rate of sixty-one bushels to the English acre, without the aid of manure; the latter is a return which farmers consider equal to that of the best land in England under the most improved culture. Some oats, raised from the same description of land, cultivated

two years in succession, were, by an experienced farmer, judged by the eye, to yield from ten to twelve quarters the English acre.

"The sandy lands, which have more or less of loam in them, are becoming more valued every year, and heavy crops of wheat and barley have been had from them with the aid of very little manure. Some of the land which gave this return bore, when in a state of nature, the grass-tree only, and was cultivated solely because it was near the farmer's residence.

"The productive powers of even inferior sandy soils are often extraordinary, and shew what the combination of heat and moisture effects in this country. At Perth and Freemantle vegetables and fruit of fine size and flavour have been produced in sand, without manure. In the former town, a radish, growing in sand, was exhibited in 1833, which measured round the root more than four feet; and a plant of mangel wurzel, in sandy soil of a better quality, on the Upper Swan, was six feet in circumference."

Mr Moore's report of his garden vegetables and fruits at the close of the year, the summer of Australia, is, broad Windsor beans podding; Negro and Canterbury beans not coming up at all; strawberries with only one berry; raspberries not bearing, but vigorous in the shoots; cherry trees looking well (not a word, however, of the fruit); peaches, all dead; sweet-scented roses extremely rare, only one or two in the colony; Chinese roses, stocks, geraniums, and mignonette, plenty.

Swedish turnips stand the summer well, no trifling matter in a climate in which drought prevails, and parches up the land so much during that season. Lucerne, as may be conjectured, where the soil is dry, and easily perforated by the long tap-root, if not planted too close in drills, succeeds well. Mr M.'s sheep are occasionally folded upon it. Mr M. strongly recommends a liberal exportation from the parent country of iron hurdles, to facilitate this mode of sheep-feeding, which may be extended with incalculable advantages.

Two and even three crops of potatoes are produced through the ever-vegetating year, but these do not produce well. Mr Moore tried the experiment (unsuccessfully) of transplanting some from self-grown seed of the preceding crop, which were too thin to be left in sole occupancy of the land where they grew; he has, however, more than the seed from them, which was important, when the seed costs *sometimes* 6d. per lb.

The corn-fields (no doubt from insufficiency of available labour) are often foul with wild oats and darnel, and there appears to be great difficulty and trouble in cleaning seed-wheat;

a better supply of machinery for cleansing it is much wanted. Smut has not affected this grain since the first year; pickling the seed has been found a sure preservative.

There is a great want of corn-mills; Mr Moore suggests a small steam-mill, placed on a large flat boat, so as to be available to the numerous farmers located on the side of the river.

Caffre-corn has been planted, and coffee; this last does not begin to grow until other grains have nearly ripened, so that it promises well as a late succession. Mr M. planted one acre in rows, six feet apart, in newly broken ground, making holes three feet in diameter, and fourteen inches in depth (which he filled up with plenty of manure mixed with earth), and depositing three grains in each hole.

All the crops occasionally suffer from the attacks of gallinules (fortunately their visits are rare)—swamp fowls like our common hen—which attack every green vegetable. When fired at, these birds fly off for a moment, but quickly return to the attack.

Fancy, says Mr Moore, one or two hundred cocks and hens in your wheat-field for one day, then imagine what mischief they must effect when scratching and picking, day after day, and night after night, without intermission; hundreds and thousands are killed, yet their numbers are not sensibly diminished.

Mr Brockman (one of the settlers), calculated that they had destroyed ten acres of his wheat.

Numbers of parroquets, about the size of the goldfinch, another class of freebooters, took such liberties with this gentleman's Caffre-corn last year, as to oblige him to cut it down before it was ripe.

From the dry quality and extreme lightness of the soil, and the excessive dearness of labour, the rearing of sheep for the sake of their wool, must continue to be the grand object of speculative industry in Western Australia, and the only exportable article for two years to come.

The breeding of horses for the India market may perhaps, as we sincerely hope, will become a source of advantage, as they are well received in this colony, and to have fewer horses than in Europe. There are good sires there.

The expenses of keeping servants of any description, are extremely disproportionate to the value of agricultural produce. Mr

Moore agreed (in one of many arrangements) with a very troublesome and dissatisfied shepherd to pay him L.73 per annum (but without diet); he had previously paid him L.90 a-year, with an allowance of rum, equivalent to L.10 a-year, and diet worth from L.30 to L.40 a-year, as may be easily understood, from the fact that salt beef has cost twelve guineas per tierce, and that servants demand meat three times a-day.

Other servants expect wages and allowances in a similar rate of extravagance. Mr Moore, on a new settlement, with two servants, whom he had taken out with him—one a mere lad—offered L.2 and L.1, 10s. a-month respectively as wages, but the answer was, “I won’t take it, Sir; if you wanted us to stay you would not offer such low wages.” Is not this enough, adds Mr M., to make me melancholy? Will not the parents of — and — stare at hearing that their sons, whom I had brought over one half the circumference of the globe, and to whom I have been invariably kind and considerate, had deserted me, and walked off with as much indifference as if I had been an utter stranger to them.”*

It being shearing time, our colonist was obliged to hire a Van Diemen’s man, *pro tempore*, who demanded seven glasses of rum and six meals a-day, and endeavoured to excite others to the same exactions; in order to break down this system of combination, Mr M. took off his clothes, dashed into the river, and washed some of his own sheep, until the men were shamed into compliance with more moderate terms; they were content on that day with two bottles of rum among three, and went to bed—drunk.

All labour is extravagantly dear, and disproportioned to the pecuniary means of the colony. L.30 was demanded from Mr M. for building a kitchen of wattled and plastered walls, eighteen feet by twelve; and it appears as if all the work-people had determined to labour only seven hours a-day, even at the extravagant rates above stated, alleging, as a reason for their conduct, that the Perth Agricultural Society has a combination among the members to cut down wages!

* These men came back again, however, to their excellent master, but the elder was ruffian enough to beat his wife and break her arm, because she would not give him more rum than his already too ample allowance.

These servants, indentured or not, feel their own importance too much; and they have been materially injured by the mistaken liberality of settlers in supplying them with ardent spirits. Hops have begun to be planted, and if good beer be substituted for rum, we shall have some hopes of an improvement in the character of agricultural servants of the colony.

As the subject of labour and labourers is a very material one to those who propose emigration to the settlement under consideration, we make no apology for inserting the remarks of Major Irwin on the subject.

“ With respect to servants, the emigrant should have two men understanding arable and sheep-farming, or what would be better, a married man with one or two sons above the age of ten. Much of his comfort and success will depend on his servants; the settler, therefore, cannot be too scrupulous in his inquiry into their character for integrity and fidelity to the masters with whom they have lived; it will be for the ultimate benefit, as well as comfort of the emigrant, that the terms of agreement he makes with his people be liberal, so that, on reaching the colony, they should not be excited to discontent by any great disproportion between their wages and the current rate in the colony. Letters from the settlement, addressed to the writer, and that come down to the 26th of January last, state, that there is no cause to complain of the now current price of agricultural labour; very good hands can be procured for 30s. per month. In addition to this are the servants’ rations, which hitherto have cost more than the wages; but they may now be calculated at less. The entire cost of a *shepherd* has been from L.60 to L.70, owing to servants of this class, especially good ones, being scarce. The expense of taking out servants is about L.20 each, and children one-third or one-half of that amount, according to their ages. The writer would not advise that the indenture should be for a longer period than three, or at most four, years, after which the servant should be at liberty to leave his master, or enter into a new agreement with him.

“ In suggesting liberality in agreements entered into with servants as good policy on the part of the emigrant, the writer would, at the same time, have it prospective, in order that every inducement should be held out to good conduct and fidelity. With this view, the wages should be somewhat low the first year, and increase step by step each succeeding year. The writer would recommend there being inserted in the indenture a clause to the effect that if, on completion of the period named therein, the servant has completed his engagement to the satisfaction of his employer, the former should be entitled to a *bonus* of from thirty to fifty acres of good land. Should the servant choose then to retire on his land, the master would thus secure in him a valuable neighbour, to assist in harvest and at other seasons of need.

“ The mode of paying shepherds adopted on the borders of Scotland is deserving of imitation. Having lately been trying in that quarter to get men of character to send out this season to his farm in the colony, the writer has learned that shepherds in Selkirkshire receive for wages, in lieu of money,

the product of a certain number of sheep. The average wages for the last two years there are calculated at from L.28 to L.30 for the best hands, while for the nine years preceding they have been but from L.18 to L.20. Married shepherds, besides the product of the sheep, have a cow's grass, worth L.6, a free house and garden, in value L.5 or L.6, and oatmeal to the extent of L.5 more. By the mode of payment adopted on the borders, the vigilant superintendence of the shepherd is in a great measure secured, by his interests being combined with those of his employer.

"The emigrant should resolutely avoid engaging to supply his servants with rations of spirits; a practice which has been productive of very baneful results in the demoralization of servants, while it inflicts a heavy tax on the master.

"Good colonial beer would form an excellent substitute; and it might be a stipulation in the indenture, that the servant should be supplied with it whenever there was any ready means of obtaining it; but the settler, after the second year, ought to brew for his own establishment."

The introduction of labourers through the agency of an *Emigration Society* seems most desirable, as the colonists very properly object to the aid of convicts from the penal settlements, on account of apprehended demoralization in their own family circles. "No mere worldly prosperity (observes Major Irwin) can compensate for the tremendous risk to which children in a penal settlement are exposed, as many a heart-broken parent can testify." The letter from a lady, published by the Australian Association already alluded to, states, "Happily we have no convicts and scarcely any crime."

The Saxony wool of the settlement now brings 7s. 6d. per lb., white merino 2s. or 3s. per lb.; of course the Saxon breed is rapidly increasing; L.25 is no uncommon price for a ram of this breed.

In the fourth annual report of the Agricultural Society of Western Australia (Dec. 21. 1835), the number of live-stock and the quantity of crop is given as follows; and exclusively of the settlements at King George's Sound and Augusta, from which we regret that the returns for 1835 have not been added, as they were included in the report for 1834. It is obvious, therefore, that the actual increase is more than appears in the annexed table.

ON THE AGRICULTURAL CONDITION

Produce.	1835. Acres.	1834. Acres.
Wheat,	1156½	564
Barley,	155½	100
Oats,	126½	116
Rye,	1½	None.
Potatoes,	31	15
Gardens,	80	Not estimated.
Other crops,	27½	123
Total in crop,	1579	918
Horn cattle,	646	500
Horses,	167	162
Sheep,	5138	3545
Goats,	657	492
Swine,	550	374
	<hr/>	<hr/>
	Tons.	
Natural hay,	228	Not estimated.
Artificial hay, . . .	58	do.

If the increase of sheep bears any fair proportion to the astonishing multiplication which has taken place in southern Australia, our settlers will soon have flocks of great extent.

The export of wool from New South Wales in 1822 amounted to 125,000 lb.; 1825, 411,000; 1828, 834,343; 1830, 991,100; and in 1834 was supposed to be 2,700,000!

The history of the Saxon breed is stated to be as follows:—The late King of Saxony, when elector, introduced the sheep called merinos from Spain, and took such pains in the management of them, that they improved considerably in quality there, the wool fetching, in the London market, double the price of what was produced from the backs of the parent stock in Spain, while the quantity imported from Germany in 1830 was twenty-five times greater than that brought from Spain.* Disease, however, has its fatal effects, and the limited quantity of food (until lucerne shall be extensively cultivated) must prevent the sheep of Australia from attaining any considerable size, or producing in the prolific degree usual in abundant pastures.

As far as climate is concerned, the quality of the wool will be, but the multiplication of the species has more

See the present state of Australia by Robert Dawson, Esq. late chief agent of the Australia Agricultural Company. 2d edition, p. 413.

restraint from the "preventive check" than is usual in Europe, where ewes are rarely barren or rams impotent. It is said that in South Australia not more than one ewe in fifty produces twins, and consequently that the number of lambs is not sufficient to place with the ewes which from any casualties (and these are more frequent than with us) may have lost their own progeny.* The pasture does not produce the same flow of milk in the ewes, consequently the vigour and growth of the lambs must be materially affected; besides, the rot, the scab, and the foot-rot are diseases which affect the sheep there as in Europe; unsoundness has prevailed in some instances to a great extent; and in many parts of our Australian colonies shepherds have been lamentably ignorant of the treatment of any of the diseases incident to the flocks. Mr Dawson found that the scab is remarkably virulent in Southern Australia, and he attributes the rot to the transition from a long season of drought to heavy and continued rains, causing the grass to grow rapidly, and this being greedily eaten in a very tender stage, operates, in his opinion, prejudicially to the stomach of the sheep. In England, he has known the same effects, even on the soundest pastures, among sheep too long fed on young grasses which have suddenly sprung up after long drought. In Western Australia, several of Mr Tanner's flock were swept away by disease in 1832; and Mr Moore observed in the stomach of one of his lambs a considerable quantity of dry earth, which he attributes to the avidity of sheep for any substance containing salt, which assuredly is one of the best preservatives of health in sheep as well as in other animals.

The introduction into the colony of experienced shepherds is most desirable. Major Irwin acknowledges the great benefit conferred on the Swan River colony by Mr Peel, in having brought out men of good character and skill in the agricultural department. Many of these men having obtained from Mr Peel their discharge, after having reimbursed him for the expense of their passage, now work for other colonists at various trades, or as farm-servants. The Major himself has had one of the families taken out by Mr Peel for five years.

"The father of this family is a man of intelligence and observation. Besides his own trade of brick and tile making, he has a competent knowledge of farming, gardening, bricklaying, lime-burning, and brewing, in which various

* Dawson.

occupations he employs himself; such is his industry, that he has been seen working for hours in the garden by moonlight, after spending a long day at labour in the field. His wife is a regular dairywoman. One of the sons is a carpenter, and another a ploughman, besides having each a knowledge of their father's trade; and the rest of the family, down to the youngest, are training up in habits of industry and labour.

"With a view of shewing what can be done by a single energetic emigrant, it may be useful to give a slight sketch of what Edwards has accomplished. One of the first things he set about was to prepare materials for a substantial house, for which purpose he made and burnt bricks and tiles out of the clay required to be removed to clear the foundation of the house, thereby saving the expense and labour of carriage. He had to explore the country to ascertain where the best lime could be procured. This he found, at the time, no nearer, than in one of the bays of Melville Water, below Perth; whence, after burning, he brought it up in boats. The timber, which was mahogany, cut down on the estate, was sawn and prepared by his son, the carpenter, with the assistance of another man, while he himself was the bricklayer and builder. The house is double, consisting of two stories, and is one of the largest in the colony.

"In the farm-yard, he has many ingenious contrivances to meet the wants and habits of its various tribes; his geese and ducks are provided with ample ponds, in the sides of which he has constructed dwellings suitable to them, where they find protection from the heat, and security from the native dog, the only animal they have to fear. His cattle and pigs are kept in fine order. In the improvement of the gardens he takes peculiar delight, and is very successful, having a good knowledge of horticulture, acquired by serving an apprenticeship to a market-gardener. The spot he fixed upon for his first one, was a somewhat elevated morass, on sloping ground, separated from the house by a ravine, and covered with rank vegetation, owing to latent springs. These, after burning off the surface, he dug out and formed into circular wells of close and substantial brick-work, rising several layers above the surface. From these wells, at different elevations, he is enabled to conduct the water in channels to almost every part of the garden.

"When the last accounts left, he was constructing earthen pipes for the purpose of completing his plans of irrigation, and also for conveying water across the ravine, to the height on which the house is situated. In this garden, and in another larger one hereafter to be noticed, almost every kind of vegetable, and as many sorts of fruit-trees as have been introduced from tropical and extra-tropical countries, are found to flourish. Among the former was the mangel-wurzel, already mentioned as having a root six feet in circumference. The tomato grows here luxuriantly, weighed down with the load of its beautiful fruit, which gives so fine a flavour to sauces, soups, &c. Among the fruit-trees he has raised many hundred almonds and Cape gooseberries, the latter a delicious fruit, producing every month; and also figs and vines in abundance, the latter bearing grapes of a fine and rich flavour.

"In front of the house are about 200 acres of rich meadow, encircled nearly by the river. The situation of a part of this meadow attracted his notice, from its being enclosed between the river and a natural moat of a semicircular form. This moat he dug out to a considerable depth and breadth, throw-

g the soil on the inner banks of the enclosure, which he faced with a firm all of green turf, and made to slope gradually on the inner side. Along the whole extent of this sloping, which is of the finest alluvial soil, are planted profusion vegetables and fruit-trees. The bank shelves down to a walk side all round within the enclosure, an area of about thirty acres. Most of e interior is now under cultivation, bearing crops of wheat, oats, and barley. e intends, both here and in the garden before mentioned, to shelter some of e walks from the sun by trellised vines. There is also, adjoining the latter rden, and separated from the house by the ravine before mentioned, a small cky hill, favourable for vines, and which he has marked out for a vineyard. "In addition to the above, is laid out in front of the house, and on the ope of the hill where there are no springs, a winter garden, in which he has played considerable ingenuity and taste. His two small gardens are from e to two acres each.

"In his agricultural pursuits, Edwards has been equally successful. He ems to have acquired his knowledge of farming, while following his trade of master-bricklayer in Gloucestershire, in consequence of having purchased a w acres of the Forest of Dean, which he reclaimed and made into a farm. t times, when the necessities of life have been very scarce and dear in the olony, he has provided for his family in abundance, and has added to their omforts within the last two years, by availing himself of his knowledge of alting and brewing.

"This indefatigable man has found time for performing the location duties an adjoining estate, the half of which, amounting to from 2000 or 3000 acres, e obtained as a return from the owner, himself a merchant at Freemantle. e also made the bricks and constructed the walls of a dwelling-house re- ntly erected by Mr Bull, who resides within a mile of him.

"The writer has occupied a much larger space than he intended with these inute details, partly to do justice to a faithful and valuable servant, and ncipally with a view of conveying some useful instruction to those who ay have yet to learn what are the requisites for a successful colonist."

On the subject of emigration to Western Australia, Mr Moore's present sentiments are similar in substance to what has peared in his published letters.* He thinks that, under the xisting circumstances of the colony, a settler is not likely to alize such a fortune as will enable him to return home,—that e must be content with a pastoral life of peace, and eventually of lenty,—a life divested of many of those cares and artificial wants, hich accompany the refinements of civilization,—that the soil s sufficiently good for all the ordinary purposes of husbandry, —that Nature has done but little for the sustenance of man, ut that industry and labour can effect all that is required.

* Major Irwin extracts at length an interesting passage in Mr Moore's etters on this subject.

SOME ACCOUNT OF THE FAIRS IN SCOTLAND.

No. IV.—SELKIRKSHIRE.

1. *Selkirk Fairs*.—Selkirk is the county town, and a royal burgh, and although it possesses these distinguished titles, it was long little else than a village. The incomes which the French officers, prisoners of war on parole, spent for years in the village, raised it to what it now is, into the rank of a small neat town. The burgh and parish contained in 1831, 2833 souls. It is thirty-six miles south of Edinburgh, on the Carlisle road, seven miles west of Melrose, and twelve from Hawick and Jedburgh.

The first fair is held on the first Wednesday of March, and is denominated the Selkirk Tryst. It is principally a market for seed, and for hiring married farm-servants and shepherds. The terms upon which the married farm-servants are hired, are much the same as those in Berwick and Roxburgh shires. Selkirk being chiefly a pastoral county, and containing large flocks of sheep, many shepherds change masters at this fair. Married shepherds get a house and corn for victuals, and the remainder of their wages consists in the permission to keep a certain number of breeding ewes, varying according to the pleasure of the masters, or the abilities of the shepherd to purchase or retain them. Those herds who have large families to support, are restricted in the ability to purchase or retain sheep, and must rather have money to purchase corn or meal. They have a cow maintained all the year round, and receive a certain allowance of potatoes. When prices of sheep are good, they are in easy circumstances, and in general they are a class of men who receive high wages. They maintain good characters, and frequently remain a long time upon the same farm. There is no method so certain of ensuring the regard of a servant for his place, and through it for his master,—which is giving the servant the most unfavourable character, for it is pleasanter for him to regard the place through the kindness of his master,—than in exciting his personal interest in the welfare of the farm on which he resides; and this is effectually accomplished by imparting to him a portion of the produce of the farm for the maintenance of

himself and family. This feeling is more strongly excited in the breasts of shepherds than of ploughmen, inasmuch as the interest derived from tending live-stock, and particularly sheep, is far more intense than the cultivation of grain. Although a shepherd apparently and actually does receive higher wages than a ploughman, he is not remunerated more for his trouble. He has no restricted hours. He must be on the move from daylight till after sunset. He must satisfy himself of the number and state of his flock. In lambing time he is deprived of sleep for weeks, and in shearing time his bodily labour is most fatiguing. To all which must be added, the anxiety which he must daily feel for hundreds of living creatures, whose welfare chiefly depends on the degree of care which he chooses to bestow upon them. The upland farmers in this county seldom trust to their own grain for seed. Most of them buy their seed, corn, oats, and barley, both in bulk and sample, at this fair, from the farmers in the lower parts of Roxburghshire. There is a trade the converse of this carried on in this market in the article of seed potatoes; the lowland farmers preferring the upland grown potatoes for seed.

Selkirk second fair is held on the 5th April, but it is always called the March market, the 5th April being in March old style. This is one of the greatest hiring markets in the south of Scotland for single male and female house-servants, unmarried ploughmen, half-grown lads, who make themselves generally useful on a farm, younger ones for stable and errand boys, and cattle herds. Most of the young women are hired for outdoor work, such as making hay, milking cows and ewes, waning fuel, &c. Such is the importance in which the fair is held, nearly the whole of the unmarried servants in Selkirkshire attend this market, and the scene for a time is the most animating that can be imagined. Many purchases of seed-barley are made at this fair, and also in great ewes, or ewes at the lambing. The ewes being big are not driven to the fair, but bargains are effected on the known characters of the different flocks, the buyers trusting to the seller's statement as to the condition of the ewes, and the description of tups by which the lambs have been got. Selkirk third fair is held on the 4th July old style. It is called the Hook Fair, being a market entirely for the hir-

ing of workers in harvest. Selkirk fourth fair, called St Lawrence Day Fair, was once a great fair, but is now dwindled down to insignificance. Selkirk fifth fair is a Lammas fair. A considerable number of lambs used to be shewn at this market, but of late years it has been superseded by the immense shews at Melrose. Selkirk sixth fair is held on the 31st October. This, like the spring April market, was instituted for the hiring of single servants for the winter, which draws together a great concourse of both masters and servants. There is a good deal of business done in this market in meal, the upland farmers purchasing largely who grow little corn themselves. Selkirk seventh fair, called the Yule Fair, is held on the 8th December old style. The upland farmers now lay in their stock of meal for the season, delivery being effected at this time, or at future periods, according to contract. This being the day for settling the Martinmas accounts with merchants and tradespeople, there is always a large attendance of farmers; the farmers having by this time sold off all their disposable produce, they wind up their pecuniary transactions for the year. Money is therefore in general circulation at this time in Selkirk, throughout all the classes of its inhabitants.

2. *Thirlstane Fairs*.—Thirlstane is a village in Ettrick Forest, and fourteen miles west of Selkirk. Thirlstane Green Fair is held on the last Wednesday in March, principally for the sale of great ewes, and for hiring servants. Some years ago this was a considerable fair, but of late years it has much fallen off, and is now very poorly attended. Thirlstane second fair is held on the 30th July. There are from 2000 to 3000 lambs shewn, none, however, in large lots, as they chiefly belong to shepherds and others, who have not sufficiently large lots to attract the attention of buyers at Melrose. There are also a number of small lots of sheep, such as yeld ewes and fat tups, most of which are taken up by dealers from Edinburgh and other places. A few are bought by butchers in the neighbourhood, and by farmers who are also sheepmasters and manufacturers from Galashiels attend at the fair to buy up the unsold lots of wool at St Boswell's. Thirlstane third fair is held on the 24th October. This market was established fourteen or fifteen years ago, by the late Lord Napier, for the sale of draft ewes, although small lots of

wethers, fat yeld ewes, and shot lambs are brought forward. There is a large show of tups for service. The sheep are all of the Cheviot breed, reared on the large sheep-farms of Ettrick and Yarrow. The number of ewes may amount to from 4000 to 5000, almost all five-year-olds, few of the ewes in this district being sold at four years old, the soft herbage yielded by the land permitting them to retain their teeth till five. As most of the stock-farmers in Selkirkshire sell their lambs, they find that five-year-old ewes produce the best lambs, being then at their full age, and consequently yielding the greatest profit.

About twenty years ago the Cheviot sheep in this district were much inferior to those on the east border in point of breeding, but now, by judicious crossing, and the active management of the store-farmers, they are equal to any Cheviot stock in the south of Scotland. The farmers pay great attention to the selection of tups and the drawing of ewe-lambs; and there is perhaps no market in Britain where the ewes are better drawn than at Thirlstane. Most of the lots look so level as to shew them off to great advantage. Indeed, some of the farmers, for the sake of appearance, go so far as to clip the extraneous wool from the face and legs, which give the ewes a very smart appearance. They thus shew more breeding than ewes with woolly heads and legs. This practice may be considered as mere trifling, and even deception, but this can be said in justification of it, that a man has a right to make the most of his stock, and purchasers must just be acute enough to detect the deceptious illusions attempted.

The ewes at this market are good thrivers, and having come to full maturity, not only produce excellent lambs, but feed well themselves. They are principally bought by dealers from Yorkshire, and other parts of the north and west of England, to the extent of at least two-thirds, the remainder are purchased by farmers and feeders from the adjoining counties. Very few black-faced sheep are shewn at this market, the lots of wethers, shot lambs, &c. are bought by farmers, dealers, and butchers, principally from Edinburgh, or for turnip-feeding. There are some cattle shewn at this fair, part of which are bred in the neighbourhood, and are purchased by farmers and feeders from the adjoining counties. Some of the cattle are small fat l

landers, which are bought by fleshers and dealers for the Edinburgh market. Any milch cows are generally purchased for the Edinburgh dairies. There is here a great sale of tups, both Cheviot and black-faced, but chiefly of the former. Numbers of these tups are brought from a distance, and eagerly purchased by the store-farmers in the neighbourhood.

The Pastoral Society of Selkirkshire hold a meeting on this market-day, and premiums are awarded for the best tups, ewes, gimmers, &c. The late Lord Napier was patron of this Society, and a zealous promoter of its interests. He laudably devoted much of his time and talents to sheep-farming. His judgment of sheep was very acute, and few noblemen knew the art so well as his Lordship, which is clearly evinced in the book which he wrote on sheep-farming. His death has been much felt as a loss to the county, whose interests he had so much at heart, and particularly as Patron of the Pastoral Society. It is well for that Society they have so efficient a successor to his Lordship as the Duke of Buccleuch, whose desire to promote the welfare of store-farmers is exceeded by no landlord in the country.

In Selkirkshire, as in other high districts, crossing is now much practised. The cross is the Cheviot ewe with the Leicester tup. This is only for the sake of the lambs, for the ewe flock is studied to be kept in purity. The store-farmer can cross a part of his flock, and keep the rest pure, for pure lambs to freshen his ewe flock with. Suppose he keeps a breeding flock of fifty score of ewes, his cast-off ewes will therefore be annually ten score. Now, thirty score of ewes kept pure will suffice to maintain that number for the lots drawn from the pure ewe lambs. This leaves twenty scores to be crossed, whose lambs will be worth from 3s. to 4s. a-head more than the pure Cheviot lambs. The sheep-farmers of Selkirkshire are a highly respectable class of men. A large meeting of them, with dealers and wool-staplers, always takes place in the afternoon of the fair, at which many lots of sheep and parcels of wool exchange hands, that have never been shewn. Much valuable information may be obtained at this meeting, in regard to markets, sheep-farming, and improvements prosecuting in the country, whilst the hilarity of the company is frequently kept

up to a late hour. It was there that the Ettrick Shepherd was to be seen in his element.

Thirlestane fourth fair is held on the third Friday of November. This is entirely a sheep-market, and was facetiously termed by the Ettrick Shepherd the fat-sheep and whisky fair. It consists of a few hundreds of sheep, in small lots, containing fat ewes, shot wethers, &c. the largest portion of which is the property of shepherds. They are bought by fleshers and small dealers; and as numbers of them are bought for marts for the winter, no bargain can be concluded without a gill of whisky being discussed over it. In this way about 5 per cent. of the value of the whole stock is spent on whisky. It is very amusing to a spectator to witness the various modes adopted of striking so many small bargains, and all of them evidently adopted as excuses for a dram.

8. *Galashiels Fairs*.—Galashiels is a thriving manufacturing village on the Gala, about twenty-eight miles south of Edinburgh, on the Carlisle road. In 1831 the village and parish contained 1534 inhabitants. The manufactures of Galashiels consists of woollen fabrics of the coarser description, and intended chiefly for the use of the female rustic, consisting of shewy plaids and shawls, and stuffs and cloths for dresses. There are two fairs here, one on the 8th July, the other the 8th October. At one time considerable exhibitions of cloth, wool, and cattle used to be brought out at these fairs; but as the woollen fabrics are now mostly made to order, and are sent away to their destination, and as the cattle never made a great shew, these fairs have dwindled away to insignificance, particularly as far as cattle are concerned.

NO. V.—PEEBLESHIRE.

1. *Peebles Fairs*.—Peebles is a neat little country town, twenty-two miles south of Edinburgh by Howgate, containing within the parish 2750 inhabitants. It is twenty-one miles up the Tweed from Selkirk. There are many fairs held in this town. The first is on the second Tuesday in January, which at one time was a good fair, but few cattle or horses now attend it. The second or Fasten' Even fair is held on the first Tuesday in March,

which like the last has fallen off in point of stock ; but it is an extensive market for the hiring of married farm-servants and shepherds. It is a considerable market for oats and barley for seed corn. The wages of servants of different kinds are much on the terms specified for Selkirkshire. There is a large concourse of farmers and servants at the fair. The third fair is held on the second Tuesday of May. There is sometimes a good show of cattle, particularly of milch cows, the aged of which are bought for the Edinburgh dairies, and the young ones for country use. Occasionally a few lots of fat and grazing cattle appear, but it is altogether a small cattle market. Lately a horse-market has been attempted to be established but without success. This being also a hiring market for single servants, a considerable number of people attend this fair. The fourth fair is held on the Tuesday after the 18th July, to intercept the unbought lambs and wool from St Boswell's, but both are unworthy of consideration. The fifth fair is held on the Wednesday before the 24th August, when a considerable number of workers for the harvest are hired. The sixth fair is held on the Tuesday before the 12th September, at which a few lots of cattle and milch cows are brought forward, quite unworthy of the notice of strangers. The seventh fair, on the second Tuesday of October, is altogether a trifling affair. The eighth fair is held on the Tuesday before the 12th December, and may be considered a sort of meal-market, at which the upland farmers who grow little corn lay in their winter store of meal, to be delivered at different periods. This is called the " Siller Fair," owing to the circulation of money which takes place this day in settling the yearly accounts of the farmers, who, having disposed of all the saleable produce, have now some cash in hand to disburse accounts. There is a great concourse of country people in numbers on this day.

1. *Eddleston Fairs.*—The first fair is held at Eddleston village on the 5th July. Seldom to the extent of a hundred cattle are shown consisting of milch cows and young grazing cattle. The second fair is held on the 25th September, and is very much like the preceding, but only it is also a hiring market for farm-servants.

2. *Skirling Fair.*—The parish and village of Skirling lie at

the western extremity of the county of Peebles. The first fair is held on the Tuesday before the 12th April, when a considerable show of cattle, principally milch cows, of the Ayrshire breed, are presented. The aged ones are bought for the Edinburgh dairies, the queys and young cows for the use of the country. A few lots of fat and grazing cattle are brought forward, the fat being mostly purchased for the Edinburgh market, and the grazing cattle by the graziers and farmers in the immediate neighbourhood. There is a good show of horses at this market, particularly for the draught, although both coaching and saddle-horses may be found. This is also a hiring market for single servants.—The second fair is held on the third Tuesday after the 11th May, and in its character it is very similar to the fair last described.—The third fair takes place on the first Wednesday after the 11th June. Although there are not so many cattle at this as in the two preceding fairs, yet the show of horses is fully better than at either.—The fourth fair is held on the 15th September. The show of cattle is good, both in milch cows and fat and lean stock. The cows and fat are purchased for the Edinburgh market, and the lean stock by the farmers in the neighbourhood, either for feeding or wintering on straw. The show of horses is good, and well attended by dealers from Edinburgh and elsewhere. There is much business transacted at all the Skirling fairs.

4. *West Linton Fair*.—West Linton is a small but neat village, prettily situated on a flat to the south of the Edinburgh and Dumfries Road, by Rutherford Inn, about seventeen miles from the former.—The first fair is held here on the Friday before the first Monday of April, or the Friday before House-of-Muir ewe market. It was established a few years ago with the prospect of gathering the ewes before the House-of-Muir market. At first a considerable number of ewes were shewn, but latterly buyers did not attend so well as expected, and they wait the result of the House-of-Muir market. This is a hiring market for servants.—The second fair is held on the day before the third Wednesday after the 11th June. This is one of the largest markets in the south of Scotland, Falkirk alone excepted. It is held for the sale of ewe and wether hogs, of the black-faced breed, principally the former. There are also many dia-

monts and young wethers. The number of all kinds of sheep shewn varies from 15,000 to 25,000, 18,000 or 20,000 being about the average. These have been all reared on the high lands of Dumfries, Lanark, and Peebles shires. The stock shewn at this market has long been famed as the improved black-faced breed, and, in fact, the improved black-faced breed is technically termed the "Linton breed." Breeders of black-faced sheep from all quarters come to West Linton to buy black-faced ewe hoggs, and particularly those who have adopted the crossing of black-faced ewes with Leicester tups. This cross is found to answer so admirably well, that many high land farmers are now crossing their entire flocks of black-faced ewes. The Lammermuir farmers have adopted this cross, and as the system, carried to the extent which they pursue it, throws them out of pure black-faced lambs, they must annually procure a number of pure black-faced ewe-lambs to maintain the number of their standing ewe flock. This system has caused a great increase in the demand for ewe hoggs at West Linton for the last eight or ten years. It was about twelve or fourteen years ago that the crossing was first attempted on the high lands of the Langton estate, near Dunse. The vindication of the system is to be found in the 8s. or 4s. per head increased value of the cross to the breeder, and also the increased value to the feeder both in wool and mutton. In these circumstances, it is no wonder that the cross is persevered in. Such is now the demand for black-faced ewe hoggs at West Linton, in consequence of the perseverance of the system which we have just described, that the market is generally cleared of them before six o'clock in the morning, at 18s. to 20s. a-head, whilst wether hoggs of the same description do not fetch more than 14s. or 15s. a-head. A brisk market is always a high-priced market. This demand for black-faced ewe hoggs at West Linton, has given rise to a new and lucrative trade in sheep. Some farmers now buy black-faced ewe lambs at Lanark and other markets, in autumn, at perhaps 10s. a-head, and after wintering them on rough pasture, without turnips, sell them at West Linton, at this fair, for 18s. or 20s. The black-faced wether hoggs at this market are bought by a different sort of customers. They are principally purchased by the

high land farmers of Angusshire, who keep them two and three years; and make excellent sheep of their age. These wethers are exposed for sale at Calloo market in Clova, Forfarshire, and none better can be found in Scotland. Some of these wether hoggs are purchased by the farmers on the Ochill Hills. The pasture of these hills also, make excellent wethers. The black-faced dinmonts and young wethers shewn at West Linton, are not taken to the north country, but are purchased by farmers and graziers in the adjoining counties. They are, of course, also well bred, and make excellent sheep when fat. West Linton is also the most extensive tup market in the south of Scotland, where 300 or 400 of the pure Linton breed are shewn every year. It is considered the best black-faced tup market in Scotland. Some very superior black-faced tups may be found here. They approach, as near as possible, to the figure of the Leicester tup, having fine round symmetries. They generally fetch from 50s. to 60s. each; the latter price not being uncommon. Breeders from all parts of the Highlands come to purchase these tups, and the effect has been a decided improvement in the Highland black-faced sheep, both in the quantity and quality of wool and mutton. The lots of black-faced sheep at Falkirk exhibit evident improvement of late years. Instead of the coarse, hairy, shaggy fleeces, and rough cheeks and legs, and narrow carcass of the old Highland black-faced breed, there are now the smooth fleeces, and clean faces and legs, and round carcass of the improved West Linton black-faced breed. Mr Robertson of Broomlee has done much to improve the black-faced breed in the south of Scotland; and the late Mr Gillespie of Ardichy, near Fort-Augustus, was the first to introduce that improved breed into the Highlands. Now, many flocks of these are to be seen extending over much of the Highlands. West Linton June Fair is, upon the whole, an excellent market, and sellers have seldom reason to complain for want of buyers, because there is perhaps in Britain not a market where there are so many customers attending in proportion to the quantity of stock shewn; and there is seldom a sheep in it left unsold at ten o'clock of the forenoon. The great and increasing demand for black-faced ewe hoggs, arising from the profitable system of crossing, pursued in several parts of the country, leave lit

doubt but this market will always present a ready sale for that species of stock. There are no cattle or horses shewn at this market, which is entirely confined to sheep.

VI.—LINLITHGOWSHIRE OR WEST-LOTHIAN.

1. *Linlithgow Fairs and Markets.*—Linlithgow is the county town, and a very ancient royal burgh, possessing the site of a royal residence. In 1831 it contained 3187 inhabitants. It is sixteen miles west of Edinburgh, and eight miles east of Falkirk. The first fair held in it is on the first Friday after the second Tuesday of January. The show of cattle is small, not exceeding 150 or 200, consisting of milch cows, fat and half fat cattle of mixed breeds. Most of the milch cows are purchased for the Edinburgh dairies; the fat by the butchers in Edinburgh and the neighbourhood for the market; and the half fat by the farmers and distillers to feed. There is a poor show of horses.—The second fair is held on the last Friday in February. This fair is in all respects very similar to the one just described.—The third fair is held on the third Friday in April. There is a better show of cattle at this fair, numbering from 200 to 300, and consisting of a good show of milch cows, fat, half fat, and grazing cattle. The cows go to Edinburgh; the fat are picked up by the butchers in the neighbourhood, and dealers in Edinburgh; and the half fat and grazing by graziers and farmers in the neighbourhood. The show of horses is also better; and this is besides a hiring market for farm-servants.—The fourth fair takes place on the second Friday of June, and displays fully as good a show of cattle and horses as the April fair.—The fifth fair is held on the second Friday of August, and is in every respect similar to the one just described.—The sixth fair takes place on the first Friday in November, when about 200 head make their appearance, consisting of milch and farrow cows, fat and half fat cattle, and winterings. The cows newly calved and to calve go to Edinburgh; the fat are bought by the butchers in the neighbourhood, and dealers from Edinburgh; and the half fat and lean cattle are picked up by the farmers and distillers to feed and winter. There is a very middling show of horses; and this is a hiring market for winter single servants.

2. *Bathgate Fairs*.—Bathgate is a small town on the middle road between Edinburgh and Glasgow, eighteen miles west of the former, and twenty-four miles east of the latter. The town and parish contained, in 1831, 3593 souls. The first fair in it is held on the second Wednesday of April, when from 200 to 300 head of cattle are shewn, consisting of milch cows, fat, half fat, and grazing cattle of a mixed description, but mostly of the Ayrshire breed. Most of the aged cows to calve and newly calved are taken to Edinburgh and Glasgow, and the young ones are retained in the country. The butchers in the neighbourhood and in Edinburgh and Glasgow buy the fat cattle, and the half fat and lean are purchased by graziers in the adjoining counties. There is a pretty fair show of horses here, although not many of superior description, and yet a good many dealers from Edinburgh and Glasgow attend. This is a hiring market for farm-servants.—The second fair is held on the first Wednesday after the term, old style. This has a rather better show of cattle than the April fair, and particularly of grazing cattle, but of every other description it is nearly the same. Very few English dealers attend this market.—The third fair is held on the fourth Wednesday of June, and is exactly similar to the two preceding fairs.—The fourth fair takes place on the third Wednesday of July, at which there is fully as good a show as at any of the former fairs, but so little variation in number and kinds, that further explanation is not requisite.—The fifth fair, which is held on the third Wednesday of August, contains less stock than the preceding.—The sixth fair is held on the fourth Wednesday of October, when there is fully a better show than in the August fair. There are not so many milch cows as in the summer markets, but more farrow. The cows, fat cattle, which are mostly Highlanders, and lean stock and horses, are disposed of in the same manner as already described in the fairs in the earlier part of the year. This is a hiring market for farm-servants.—The seventh fair is called the “Winter Fair,” and is held on the Wednesday after Martinmas, and exhibits a rather middling display of cattle, consisting mostly of milch and farrow cows, and wintering cattle of a mixed description, with very few fat. The green cows are bought for the Edinburgh and Glasgow dairies, and the farrow cows and lean cattle by the farmers and

feeders in the neighbourhood. There is a middling show of horses, and mostly of inferior descriptions.

Upon the whole, there is a great monotony in all the Bathgate fairs of the kinds of stock shown, but the numbers vary, from 150 to 200 being about an average, and never exceeding 300.

8. *Broxburn Fair*.—Broxburn is a small village on the middle road between Edinburgh and Glasgow, twelve miles from the former and thirty from the latter. There is only one fair held at this place, which is on the Friday after the second Tuesday of September, that is, on the Friday after the Falkirk September Tryst. The stock which frequents this fair amounts to about 200 or 300 head, consisting of milch cows, a few fat cattle, and a number of half fat and lean cattle for turnips, and wintering on straw. These respective kinds of stock being generally disposed of to similar purchasers as at the Bathgate fairs, it is here unnecessary to repeat the recital.

ON EXPERIMENTAL FARMS.

Observations on the present State and Future Prospects of Agriculture, illustrative of the Advantages of an Experimental Farm. By George Lewis, Tenant in Boghillie, near Kirkcaldy. G. S. Tullis, Cupar. A. & C. Black, Edinburgh. Longman & Co. London. 1836.

THAT a suitably endowed and ably conducted experimental farm would be of service, even to the agriculture of Scotland, is a statement to which few would not readily assent; but that an experimental farm, to be serviceable at all, must be suitably endowed and ably conducted, is an assertion which demands consent. The utility of an experimental farm, therefore, entirely depends on the spaciousness of its foundation, and the ability with which it is conducted. Hence its extent must first be ascertained, before its probable utility to agriculture can be made apparent. But before proceeding to ascertain that important point, it may be useful to consider some of the characteristics of an experimental farm, in order that a clear conception of its province may be attained.

An experimental farm is not like an experimental garden.

An experimental garden is like any other garden. The experiments in it can be performed in a similar manner, and on a similar scale to the operations in a garden. Operations may be carried on in the one as satisfactorily as in the other, and they may of course be easily transferred from the one to the other. Similar results may be confidently anticipated from similar operations in the one as in the other. Not so is the case of an experimental farm. In it experiments cannot be performed on the same scale, nor under similar circumstances, as the operations of an ordinary farm. They could not be transferred exactly as they were performed to the broad fields. They could not exactly apply, when taken from enclosure and shelter to exposure and defencelessness. Similar results cannot be realized by operations which have been performed under dissimilar circumstances. An experimental farm, therefore, in its operations, does not occupy the same relative position in regard to an ordinary farm, as an experimental garden does to a common garden. Nor are the conclusions derivable from the experiments in an experimental garden analogous to those from an experimental farm. This great difference between them must be especially borne in mind, in conducting an experimental farm; for it is this great difference in their characteristics which raises the entire question of the probable success of an experimental farm. The experiments being performed in similar circumstances in an experimental and a common garden, they can be transferred into the latter at any time, in the most confident security of the result. On the other hand, let the results be ever so favourable in an experimental farm, they will not be repeated by most farmers with a confident security of success; because, for this simple reason, they cannot be repeated in the ordinary fields under similar circumstances, and cannot, therefore, inspire confidence. This distrust may be attributed to the prejudice which farmers are said to feel against every thing new. Be the motive ascribed to what it may, it is, in the circumstances, a natural sensibility on the part of farmers. The aversion to try an experiment, which consumes a year in the time, involves the risk of a portion of a crop, and a portion of all crops through the rotation, is a natural feeling. It is useless to perform experiments for the benefit of farm

their confidence can be insured in them. Of what avail will the best conducted experiments in an experimental farm be, if farmers cannot be induced to adopt them heartily in the fields? The annunciation of results may gratify curiosity, but what benefit will the country derive from experiments confined within the enclosures of an experimental farm? It may be, and it will be, that a few farmers of unprejudiced minds will perform the experiments with every desire of success, and it may be that others will follow the example. But what need of the expensive apparatus of an experimental farm to induce a few farmers to try an experiment? Some will be found at all times ready to give efficacy, even to a suggestion, and others will thereafter follow the example; but this has hitherto been the usual way of any new practice recommending itself to the good graces of farmers, without the intervention of an experimental farm. Unless means be adopted to disseminate a proved experiment simultaneously over the country, an experimental farm will be of little national benefit. It should form a part of the duty of the conductors of such an establishment to use those means; and *the most efficacious of them will be the securing the confidence of farmers.* The moment their confidence can be obtained, every proved experiment in the experimental farm will be dispersed throughout the country with the quickness of an electric spark.

Let us endeavour to ascertain in what way the confidence of farmers can be secured to the experimental operations of an experimental farm. We have already seen that the experiments in an experimental garden are performed similarly to what they may be in a garden. Every fact satisfactorily established in an experimental garden is received with confidence by all gardeners, because they are well assured, that if they conduct the operation in a similar way, they will produce similar results. Hence the eagerness of every intelligent gardener to obtain information of every new experiment, and the rapidity which every new practice is dispersed through the country. Now, conduct an experimental farm on the same principles as an experimental garden, and the same results may be confidently anticipated. The analogy which at present is attempted to be instituted between an experimental garden and an experimental farm would only then be complete. Render concomitant circumstances in an experimental

farm such as they exist on farms, and conduct the experiments with "appliances and means" such as are to be found on farms, and there will be no doubt of farmers receiving the results with confidence. Shew them that they may do the same things, and that they have the means of doing the same things, on their farms, as have been done and produced certain results on the experimental farm, and they will not be backward in following the example. Take the risk of proving the results in the experimental farm, and shew the value of the results to farmers themselves, and the experiment will be performed on half the farms of the kingdom in the first season. But how can experiments be possibly performed in an experimental farm in a manner to be analogous to those in an experimental garden? Simply by performing them in an experimental farm as operations would be performed on a larger scale on a farm. This leads to the consideration of the construction of an experimental farm.

The leading operation which should determine the size of the fields in an experimental farm is ploughing. Their size being thus ascertained, the size of the farm itself will be easily determined. It is the experience of every farmer that frequent turnings in ploughing waste much time, and there is much of the land in entering and coming out of a short furrow which is never well ploughed. Very small fields are objectionable in this respect. The fields in an experimental farm should not be very small, else they will waste much time in ploughing, and every other operation performed in them will not be analogous to the operations of larger fields on farms. Every arable field in an experimental farm should therefore be of that size which will admit of being ploughed in ordinary time, and at the same time not larger than to do the experiments in it justice. Now three acres imperial we conceive would be too small; the ridges, if made long, would not be numerous enough, and if they had the number, they would be too short. We should say five acres were the least extent to do justice to ploughing operations, along, across, and diagonally over the ridges. But five acres are too small a space to enclose with a fence, for the crops raised in that enclosed space would be placed in entirely different circumstances to what they would be on a farm. The field should in that case be made larger, say ten acres, which is a tolerable size for fields on small farms; or it

could be made as large as to include all the series of a rotation ; a four course would make the field twenty acres, a five course twenty-five acres, and a six course thirty acres. Perhaps this would be a good arrangement, and the experiments on the crops would be available to small tenants, who frequently cultivate all their crops within a ring-fence. We have suggested five acres as the least space of ground for a division, and were each division larger so much the better.

Were a new variety of grain to be experimented on, it would be desirable to increase its quantity by every means. A piece of ground might be allotted for the particular purpose, and whenever a sufficient quantity of it was acquired to sow five acres, then its culture might be transferred to the fields. Another piece of ground should be appropriated to engender new varieties of grain by impregnation. We conceive that each division or five acres should be sown with one variety and kind of grain. Different varieties sown in proximity would be apt to engender hybrids in the fields, which should be avoided for the sake of the seed ; besides different kinds of grain on ridges of the same division would not only be anomalous to consistent farming, but might injure the result of the rotation. Different varieties, therefore, of the same grain should occupy different fields, for one variety might be sown at one time and another at another time, and each might have a different effect on the succeeding crops in the rotation, and might be cultivated in a different rotation. Each should also be cultivated in these various ways upon different classes of soil, upon clayey, loamy, gravelly, and peaty soils, and each field thus sown should be specially prepared for the culture of the particular grain to be experimented on. These varieties of grain should also be experimented on at high and low altitudes, in different aspects, and in exposed and sheltered situations. Suppose wheat is the kind of grain to be experimented on. New varieties will be increased, and new varieties engendered in separate spaces of ground appropriated for the purpose ; but what extent of ground they will cover it is difficult to anticipate. Suppose there are only four varieties of wheat chosen at one time to be experimented on, to sow them in all the varieties of situations enumerated above they would occupy 220 acres. Barley is a substitute for wheat, and as it cannot enter into the rotation of which wheat forms one member, separate fields must be allotted

to it; and supposing four varieties are experimented on, they will also occupy a space of 220 acres. Four varieties of oats, as members of the wheat and barley rotations, taking the rotations of the average duration of five years, would occupy 150 acres; but oats should be experimented on on clean ground, as well as the other species of grain, before its properties can be thoroughly investigated. Thus the three kinds of grain commonly cultivated will occupy about 600 acres, and as they embrace only two-fifths of the rotation, they with the rest of the crops in the rotation will occupy about 1000 acres.

We cannot enter so particularly into every other species of seed which requires attention; but the vast number of seeds suitable for forage, roots, oils, dyes, &c., must be extensively experimented on. Plants for their fibres, tubers, and edible substances, must not be lost sight of; and every kind of seed, root, forage, or herbage, which may reasonably be expected to yield profit to the farmer by cultivation, should be investigated till their worthlessness or utility is established. These various plants would occupy a large space of ground.

Then comes the great subject of Live Stock of all denominations; their intrinsic values as separate breeds; the relative value of breeds, and the values of the crosses which each and all would produce. Here is a field for investigation which would of itself employ an experimental farm. Besides the breeding department and the subject of wool, the highly interesting subject of feeding, in all its varieties of raw and prepared food, in the house or in courts, claim especial regard; and did the experimental farm investigate thoroughly no other department than stock, it would confer an everlasting benefit on farmers, and through them on the country. There is no department of farming so intricate, and on which farmers generally display so much ignorance, as in the progressive improvement and common management of stock, particularly of horses. The stock would occupy a much larger space than the grains and seeds; sheep, some varieties at least, require a large range of pasture; and cattle and horses should be well accommodated in suitable buildings in winter, and provided with sheds as a refuge from rain and heat and cold in summer.

The subject of planting deserves minute and patient investi-

gation. Much has yet to be learned in regard to the habits of forest trees. They have hitherto been planted promiscuously in all situations, in the hopes that one of the kinds would survive. This is an unphilosophical mode of proceeding. If we look at Nature as she exhibits her freedom of growth in the woods of America, we discover the trees not promiscuously mixed in many varieties, but in masses, imposing a grandeur which we have no conception of in this country. A philosophical inquirer naturally investigates the cause of their growing in masses, and he discovers, what common sense might have almost previously suggested, that different soils support different kinds of trees, and so exactly suited are the trees there to the soil, that the emigrant has only to look at the former to ascertain the nature and quality of the latter. And why should not the various soils of this country be made to support those trees only which suit their natures; but has our knowledge yet revealed to us the soil in which each tree delights to luxuriate? Much ground will require to be appropriated to the growth of trees in all the variety of soil and situation. In the choice of situation and arrangement of trees, much might be done in an experimental farm to improve the taste of landscape gardening, by preserving imperishable memorials of forest scenery. Beauty of scene and shelter, derived from wood, impart pleasing associations, and insure valuable products.

Experiments on the best mode of improving bog and muir land are not undeserving attention in an experimental farm, if not for our own sakes, for the sake of poor Ireland. Many curious experiments may be made on the capability of bog and muir to support various sorts of plants, and among these some no doubt would find their congenial element.

We have no intention of entering into the details of minutiae requisite for the construction of an experimental farm; our object being merely to take a *superficial* view of the various objects which, occupying the *superficies* of the ground, should find a place in an experimental farm, in order to estimate the probable extent which such a farm should comprehend. For if the extent which the farm would necessarily require were fixed, its cost would easily be ascertained. The extent, however, we must estimate in a great measure by conjecture, not but that a pretty accurate estimate might be adduced from the investiga-

tion of minutiae; but avoiding for the present so tedious an investigation, we have grounds to form a supposition from the data which are already in our possession. Having fixed each division for cropping to comprehend five acres, which, in our opinion, is the least extent of ground upon which a plough and pair of horses would have the freedom to work as they would on a farm, and if the division comprehended ten acres so much the better,—there is little difficulty in ascertaining the whole space which a given number of crops would occupy under a regular rotation. Taking only four varieties, each of wheat, barley, and oats, for experiment at one time, the crops in the rotation with them will be found, we have seen, to occupy nearly 1000 acres imperial. The various seeds which would be cultivated for other purposes than grain, would occupy, we presume, other 1000 acres, for it must be held in remembrance, that they also must be cultivated in divisions, which the plough must operate upon. It is not so easily foreseen what extent of ground the live-stock would require. What with grazing, top-dressing, and experiments on various kinds of pasture grasses at different elevations, the space must be considerable. Soiling grass in summer, and turnips and other roots in winter, would be partly furnished by the grain divisions; but with all these assistances, we conceive 2000 acres would be required, one-half in the hill, and the other half in the plain; but as experiments should be tried with black-faced sheep, small black cattle, and horses on heath pasture in summer, 2000 acres would not suffice for this department. The plantations dispersed in different situations over the farm would require 1000 acres; and bog and muir land a couple of hundred acres. Thus, the experimental farm should comprehend 5200 acres to do justice to every subject which ought to be experimented upon. As the farm would contain 2000 acres of good and tolerable land, we conceive that 20s. per acre would not be an over estimate of its value, that is, at a yearly rent of L.5000, regardless of the value of the bog and muir land. As to the stocking and buildings, their value would probably be not less than L.20,000; although it is probable much of the live-stock, and many of the implements of husbandry, would be contributed in donations by agriculturists. The annual expense of an establishment would be difficult to estimate. There is much hand-labour, for which women are peculiarly fitted.

There must also be many superintendents, possessed of thorough practical knowledge. Acute observation should be the principal characteristic of these superintendents; for on accuracy of observation, and correctness in recording results, the value of the experiments as an incentive to imitation mainly depends. The manager of such a farm should be a man of no common attainments. In him perfect science and perfect practice should "meet together."

To many this estimate of the size and cost of an experimental farm will appear extravagant. Thus estimated, it is certainly a costly establishment. But when the multiplicity of objects which claim its attention are considered, its extent will be found not to be overstated. Some think 500 acres would answer the purpose. Why, if all the objects which should be found in an experimental farm were merely accommodated with growing and standing room, that space would not be able to contain them. Minute experiments on the progressive development of plants through the influence of manure and climate, may be interesting investigations to the botanical physiologist, and such primary experiments are absolutely requisite to establish the excellence or worthlessness of plants, and they would not occupy much ground; but to stop short at this stage and not pursue the culture of plants on a scale commensurate with the operations of a farm, would be to render the experimental farm of little avail to practical husbandry and the interests of farmers. Until this point, the size of the experimental farm is settled, it were fruitless to comment on Mr Lewis's or any other plan.

There may be difficulty in the research, but we conceive that a farm of the extent required could be found, although all the land might not, perhaps, belong to the same landlord. Such a farm, rendered highly fertile by draining, manuring, liming, and labour, and plenshed, as an experimental farm should be, with all the varieties of crops, stock, implements, and woods, would be a magnificent spectacle. What a field of observation for the botanist and physiologist, amongst a multiplicity of objects subservient to experiment! What a laboratory of research for the chemical analyst and compounder in every possible variety of earths, manures, plants, and products of vegetation! What a museum of objects for the naturalist to acquire the living habits and instincts of animals useful to man, and hurtful

to the fruits of his labour ! What an arena of skill for the practical husbandman to exercise his ingenuity in varying the modes of culture ! What an object of intense curiosity and wonder to the rustic labourer ! Above all, with what interest and solicitude would the patriot contemplate the appliances of such a mighty engine set in motion, to work out the problem of agricultural prosperity !

ON AN EXPEDITIOUS AND ECONOMICAL METHOD OF IMPROVING
GRASS LAND IN SCOTLAND.

THE improvement of grass land is a subject on which much has already been written by various authors, and it may be thought superfluous to say more upon it. Yet I will add a few remarks, applicable to the present times, which has been termed "the commencement of a new era in agriculture ;" I allude to the prevalent practice in using bone-dust, in the cultivation of turnips generally, but more particularly, upon acclivities inaccessible to the dung cart, and at elevations where corn does not ripen well in an average year, the avowed object of such aration being, *to ultimately improve the sheep pasture*. That theory is unexceptionable, but I mean to shew, that where the practice is carried to excess, and conducted upon erroneous principles, as it frequently is, the result will assuredly be injurious to both landlord and tenant. My object in the present communication is, to caution farmers against the improvident use of the plough under such circumstances ; to point out the causes of failure, so frequently complained of, in obtaining good permanent pasture after a rotation of arable culture, upon cold high land ; and to describe a process by which that desirable object may be attained with greater certainty, than by the methods usually practised for that purpose.

In elucidation of my object, I will first take a retrospective view of former extensions of arable culture upon our high cold lands, and the results thereof.

It is evident, from the almost obsolete traces of the plough at very considerable elevations upon many of our hills, that arable culture had extended there in remote ages. But whether the objects of that aration was the improvement of or growth of corn, we have no means of ascertaining. It bably was for the latter object, as is indicated by the re

regularly formed ridges. We may suppose the farmers of those days, having been stimulated, either by a succession of early harvests, or high price of corn, perhaps by both, to so extend their culture, would again restrict it, when their speculation proved adverse. The growth of corn on such land must have been still more hazardous in former times than at present, because, underground draining, so necessary for the improvement of cold land, was not then practised.

We do not know whether grass seeds were sown upon the land in question, when thrown out of cultivation, probably not; and even supposing the indigenous grasses, roots, and seeds had been extirpated by a long course of clean culture, as in that case they would be, the beautiful hand of Nature has in the course of ages which have since elapsed, supplied herbage suitable to the soil and climate, as we now see those lands clothed in the same manner as the lands adjoining, where no traces of the plough are visible.

In drawing nearer to the present age, I next *note* the period about the commencement, and in the early part of the American war of independence. At that time, Scottish agriculture made rapid progress in various improvements, such as the use of a pair of horse ploughs; the proper application of manures; superior culture of turnips; more general cultivation of clover and rye grass, and in proper rotations of alternate white and green crops. These beneficial improvements were in a great measure effected by the spirited precept and example of the late Mr Dawson of Frogden, Roxburghshire;—a man who deserved well of his country, and whose name should be held in remembrance by Scotch agriculturists. The admirable system of Scotch banking, having been perfected about the same period, liberally supplied the main spring to the enterprising industry of farmers. Mr Dawson's practice in improved husbandry was judiciously confined to land suitable for the growth of corn, and it would have been well for many of his countrymen had they followed his example in that respect, but they unfortunately exceeded the bounds of prudence, in carrying their arable culture to excess. A great extent of hill pasture land was then broken up, and marl and lime freely applied for the purpose of stimulating it to the growth of corn; and although underdraining was but imperfectly understood at that time, and less practised

than at present, yet that *corn growing mania* was prosperous for a time, so long as seasons were favourable, and prices of corn kept up. But a sad reverse soon followed. For, towards the conclusion of that unfortunate war, seasons proved adverse, and on the return of peace, trade was thrown open, speculation in home produce ceased, bankers restricted their credits, and corn fell greatly below remunerating prices. The results were such as might have been anticipated, hundreds of farmers were totally ruined, and many landlords sustained serious loss from those ill judged projects. The cold high lands which had been so imprudently broken up, were returned upon the landlord's hands, and were thrown out of cultivation in an impoverished state. In some instances the seeds of cultivated grasses were sown, which produced a scanty herbage in the first instance, and soon after died away, and *the native grasses having been destroyed by the prolonged arable culture*, the land became little better than a barren waste, requiring the efforts of nature in the succeeding half century, to restore it to as good pasturage for sheep, as before it had been denuded in the manner here stated. In some instances, the bad effects are seen at the present day, for where those lands have since remained uncultivated, the pasture they produce is generally not so valuable as that upon the lands adjoining, which had not been broken upon.

The severe penalty on imprudence, inflicted as here detailed, ought to have served as a beacon, to guard both landlords and tenants against again entering into such hazardous speculations; but it appears to have been either neglected or forgotten in the time of the French Revolutionary war, when corn, from causes here necessary to mention, rose to unprecedented high prices. At that time, a great many, otherwise prudent men, miscalculating upon the permanency of high prices, were induced to hire farms at exorbitant high rents, on having permission to break up old grass land; and a great extent of high cold land, useful as sheep pasture, but not adapted to the growth of corn in our cold variable climate, was consequently broken up and converted into arable. The results of this *second mania* were still more fatal than the first, the French war lasting much longer than the American, and the prices of produce being maintained at a much higher rate, both landlords and tenants miscalculated upon the permanency of their prosperity. They increased their

establishments and general expenditure in various ways, both present and prospective, and in such a manner as could not be well reduced to the former standard, when the depression consequent upon the return of peace with its contingencies, ultimately took place. In that dilemma, the landed interest struggled long and hard against their impending fate. The land was cross cropped and exhausted, and debts deep and lasting were contracted in the vain hope of a reaction in prices of produce. Hence, difficulties arose, from which many worthy men never recovered, and are by others severely felt to the present day. Painful as this view of the subject is, still it does not go the extent of the calamity. For the cold high lands, of which I treat, having been deserted and thrown out of cultivation, as formerly, were generally reduced to a complete state of exhaustion in the manner I have mentioned ; *and the roots and seeds of the indigenous plants having been extirpated by extended courses of aration*, much of that misused land still remains in an unprofitable state, and many more years must yet elapse, before it can be again covered by profitable natural herbage. There are, of course, some exceptions to the general result, but these are unfortunately thin strewed.

Having thus commented upon the errors of cultivation of cold high land in former times, I will now consider the present, which, as I have before said, has been termed "a new era in agriculture," from the prevalent system of using bone-dust in the cultivation of turnips, and breaking up high pasture land for that purpose ; a practice which I assert, if persevered in, as in the two last seasons, will soon amount to a *third mania* in attempting to grow corn in situations where the laws of nature do not admit of its profitable culture in an average of years ; and that within the memory of man, for there are many others besides myself, now alive, who will remember the two former failures in that vain and ruinous attempt.

Let it not be supposed I mean to condemn the use of bone-dust as a manure for turnips. On the contrary, I highly approve of its use, when and where properly applied. My only object is to endeavour to dissuade occupiers from going to an excess in breaking up cold high land for the purpose of growing corn in the first instance, although I admit it may now be attempted with greater hopes of success than formerly, as under-

ground draining is now so much better understood ; and secondly, for the purpose of growing turnips by the aid of bone-dust upon acclivities inaccessible to the dung cart, and ultimately for the purpose of returning the land to pasture with an improved *permanent herbage*.

On my communicating verbally with some intelligent farmers on this subject, they told me their object was not so much to grow corn and turnips on those lands, as to improve the pasture, and for that reason they only put a temporary fence round such land to protect the crops upon it while under arable culture, and removed those fences when the land was seeded down, so that the sheep may have no obstruction in ranging over it at pleasure. With this view, they first take a crop *or two* of oats after breaking up, for *the purpose of rotting the turf*, then bone-dust turnips eaten upon the ground by sheep, and in the following year, barley or oats with grass seeds, after which the land is thrown out to the hill pasture. The system is plausible enough, but in answer, I say, if the real object of the aration is the improvement of pasture, it should not be attempted without permanent enclosure, because, sheep ranging over unimproved natural pasture, having access at pleasure to herbage upon land which had been limed or bone-dusted under previous arable culture, starve themselves by nibbling upon that scanty pasture, to the neglect of their usual abundant supply of food upon the adjoining uncultivated land ; and surely improved pasture within permanent enclosures can be more profitably grazed by feeding, than by store stock of any kind.*

When cold high land is broken up with the intention of improving the pasture, corn should not be sown upon it, as is usually done in the first, and sometimes second year, *for the purpose of rotting the old turf*, consequently destroying the natural herbage. On the contrary, that course of husbandry should be as brief as possible, *for the express purpose of preserving the roots and seeds of the native plants*. The turf should not be thoroughly rotted, it should only be broken and thinned, or, as it may be termed, “transplanted.” Lime or bone-dust should be spread over the surface ; lime in preference, where it can

* The habit of the sheep on fresh pasture is here truly described ; I we are not sure that such grass would be more profitably devoted to feed than to the support of store stock.—EDITOR.

be had at a reasonable rate, and white clover and perennial ryegrass sown upon it. The succeeding pasturage will then be renovated, and greatly improved. I particularize those two grasses, as white clover and perennial ryegrass, of which there are many varieties, are indigenous in most places in our cold climate, and their seeds are readily procured from seedsmen, and generally at reasonable prices.

In cases where it is desirable to grow turnips upon the land in question, that object may be attained without growing corn in the first instance. The land should be ploughed in the autumn of the first year. In the spring of the second, it should be cross-ploughed and cultivated in the usual way, then limed or bone-dusted, and the turnip-seed sown, and although the crop will not generally be so good as if the turf had been completely rotted by previous corn cropping, the native grasses are not extirpated, which should be the principal consideration in the process. The turnip crop, be it great or small, should be eaten upon the ground by sheep. And in the spring of the third year the grass-seeds, as before mentioned, should be sown either with or without a corn-crop, according to local circumstances. By this short course of culture, the roots of the natural grasses are not entirely destroyed, while the greater part of their seeds are preserved, and these, with the seeds sown, soon produce a thick permanent pasture.

I have been told that cold hill land, even after having been severely corn-cropped, may be clothed with good permanent herbage, by means of sowing it thick with well-selected grass-seeds, suited to the soil and climate. I much doubt it. I have never seen it effected under such circumstances, though I have seen many failures in the attempt. That suitable seeds may be selected, and may be sown, I admit; but I answer, in the words of Hotspur Percy, "Will they come?" and I will add, even suppose they do come, "Will they stay?" We know that theory is not borne out in practice, and it is idle to argue upon it. It is even with great difficulty good permanent pasture can be obtained in a few years, by sowing the best selection of grass-seeds upon old tilled land of the first quality, and in the most favoured situations. But good pasture may be obtained in one year upon old tilled land, though of inferior quality, by the process called "inoculation," that is, by transplanting good old

turf in small pieces over the land. That practice, with many other improvements in husbandry, emanated from Mr Coke's estate in Norfolk. The system which I here recommend for improving hill-pasture, is similar in effect to transplanting or inoculating, though upon a broader, ruder, and less expensive scale.

In autumn last I visited Moffat, Dumfriesshire, and in the vicinity of that place I observed a great extent of improved pasture-land reaching high up the sides of the hills, effected, as I was informed, by methods similar to what I have here before recommended. Part of those pastures had been improved several years ago. Others more recently, and some were then in progress. In the latter, so far as I saw, there did not appear to be any attempt at growing either corn or turnips. The fields are enclosed by stone-walls, as thorn hedges would not thrive in such situations. The dry spots of land within the new enclosures were broken up, and cultivated in the usual way. The land was then limed, and grass-seeds sown upon it, which completed the improving process. I was told the lime used was brought thirty miles, land-carriage, and the heavy expense of it, with that of the cultivation and seeding, incurred by the spirited and judicious occupiers, for the sole object of improving their pastures, without regard to corn-growing; I trust they live under liberal landlords, and have long leases. I was, however, happy to see their speculations, in so far as regards their improvement of pasture, completely answered that purpose. For within the enclosures I saw fine Galloway bullocks, and Leicesters crossed with Cheviot sheep *feeding*, while, upon the unimproved land outside, the black-faced heath sheep were barely *existing*. That is an example worthy of imitation, and similar improvements may be effected in many other places, by the joint efforts of liberal landlords and spirited tenants. But no man is justified in laying out money in improving another person's estate, unless he is secured by a compensating lease, or remunerated in some other way.

The Moffat enclosures are generally laid out in squares, and with their stone-walls have a stiff unsightly appearance in the landscape, being more unpleasant to the eye in the scenery of undulating hill and dale. I, however, observed that woods and plantations in that district have been cleared

better taste than in many other parts of Scotland. I there saw but few of those ill-judged and useless straight lines of fir plantations called "belts," dividing fields. Their timber is principally deciduous forest-trees, and those properly disposed for use and ornament. I was also delighted in that I there saw no vestiges of that horrid system of haggling, mangling, and lopping the branches of trees erroneously called "pruning." Consequently the timber is not only ornamental, but in a vigorous thriving state, and when arrived at maturity, felled for use, such trees will be found proportionally more valuable to the proprietor, because they will be sound timber; whereas the mangled trees, with the stem bark healed over their wounds, prove deceptive when taken down, and when cut up and converted, are found of little value.

From this digression I again revert to the enclosures, and remark that it is not necessary the fences of fields should be carried in straight lines, nor the fields formed in squares, when not intended for arable culture. The principal considerations in enclosing land for permanent pasture, should be a regular and plentiful supply of water, shelter and shade; to these may be added picturesque beauty. These desired objects should be attained where practicable, without regard to the lines the fences may take in the accomplishment; and regard should be paid to not interrupting the sheep range on the hills.

Many sheep farms are quite destitute of permanent enclosures and improved pasture, and others have none worthy of notice, though upon most there is a capability of forming extensive improvements on the Moffat principles here described. I was quite surprised on seeing so little enclosed pasture in some of the pastoral districts in the south of Scotland; the more so as the verdant hills and valleys, with the classic streams of those districts, are quite calculated for such improvement, and the land generally occupied by a most respectable, intelligent, and enterprising body of farmers. On making inquiry on the subject, I was informed, the stock farms there are frequently let upon nine years' leases, or some other short term; and the tenants, although they had great confidence in their landlords, did not think themselves justified in expending much money in such necessary improvements under their short tenures. But all with whom I conversed on that matter, appeared extremely de-

sirous of obtaining an extension of improved permanent pasture. In such cases, the expenses should surely be borne by the landlords, who would of course fix the rents proportionate to their outlay, and they could not possibly make a more profitable investment. But, unfortunately, in the districts to which I allude, the great and necessary stimulant in such improvements can only be obtained at present at an extravagant expense. *Lime* is there brought a great distance by land-carriage, sometimes over hilly bad roads. One highly respectable farmer told me, he brought his lime for laying on his lands thirty-three or thirty-four miles, and that his horses and carts were three days in completing their journeys. The expense which occupiers are thus put to, for an article indispensably necessary in good cultivation, is tantamount to a prohibition to improvement in places so situated; yet there is great facility in laying a rail-road from the centre of the district to which I allude, to communicate from thence through the lime and coal fields to Edinburgh and the port of Leith, by which the transit would be greatly expedited, and expense of carriage much reduced, in corn, wool, coal, lime, bone-dust, iron, timber, slate, and various other heavy articles of produce and commerce. It surely would be greatly to the advantage of the great landholders in this district to promote that undertaking, and, in so doing, they would not only benefit themselves and their tenantry, but confer an indelible boon upon their country.

This is no chimerical scheme; the advantages to be derived are so obvious, there can be no doubt it will be carried into effect by some means, and that at no distant period. But it is most desirable the landed interest should take the lead in this instance. It would appear the members of that great interest are either over remiss, or less clear-sighted in their own concerns, if not biassed by erroneous principles, than the manufacturing and commercial interests. For nearly all great national improvements are effected when these two interests preponderate; and, let it be observed, those two are now flourishing while agriculture languishes, all parties having now free scope for exertion. It is true, we have seen the reverse, but, let it be borne in mind, farming prosperity was only temporary; it arose from fictitious causes, and soon vanished, as I have shewn. It ought in future to be founded upon sounder principles.

F. B.

TABLE of the Fair Prices of Wheat in the County of Fife, from 1622 to 1885, including a period of 214 years, in series of 19 years each. By Mr ROBERT BALLINGAL, Newton of Kingsdale, Fife.

Kings' Reign.	Years.	Fairs' Prices, Imperial Quarter.	Kings' Reign.	Years.	Fairs' Prices, Imperial Quarter.
James I.	1622	£1 16 5½	Charles II.	*1671	...
...	1623	1 19 9	...	*1672	£0 16 7
...	1624	1 13 1½	...	*1673	0 16 7
...	*1625	1 9 9½	...	1674	1 10 11
Charles I.	*1626	1 4 4	...	1675	1 13 1½
...	*1627	1 4 4	...	1676	1 2 1
...	*1628	1 19 9	...	1677	0 16 7
...	*1629	1 13 1½	...	1678	0 16 7
...	1630	1 19 9	...	...	...
...	1631	1 6 6	...	*1679	0 19 10½
...	1632	1 6 6	...	1680	0 15 5½
...	1633	1 9 9½	...	1681	0 13 9½
...	1634	1 13 1	...	1682	0 19 10½
...	*1635	...	...	1683	0 16 7
...	*1636	...	...	1684	1 2 1
...	*1637	...	James II.	1685	0 16 0
...	*1638	...	...	1686	0 16 7
...	*1639	...	...	1687	0 15 5½
...	*1640	...	...	*1688	0 16 0
...	...	...	William & Mary	*1689	0 19 10½
...	*1641	...	...	*1690	1 4 3½
...	*1642	...	...	*1691	0 17 7½
...	*1643	...	...	*1692	0 17 7½
...	*1644	...	...	*1693	1 2 7
...	*1645	...	...	*1694	1 6 6
...	*1646	...	...	*1695	1 10 10½
...	*1647	...	...	*1696	1 9 9½
...	*1648	...	...	*1697	1 14 3
Charles II.	1649	2 2 5	...	1698	1 19 9
...	1650	2 4 1	...	1699	1 19 9
Common-	1651	2 6 4½	...	1700	1 3 2½
wealth	*1652	1 19 9	...	1701	0 19 10½
...	*1653	0 19 10½	...	1702	0 19 10½
...	*1654	0 19 10½	Anne	*1703	1 2 1
...	1655	1 1 0	...	*1704	1 1 0
...	*1656	0 19 10½	...	*1705	0 16 6½
...	*1657	0 19 10½	...	*1706	0 14 11
Richard	*1658	1 10 11	...	*1707	0 17 8½
...	1659	1 4 10½	...	*1708	1 5 5
...	...	...	...	*1709	1 14 0
Charles II.	1660	1 6 6	...	*1710	...
Restored	1661	1 6 6	...	*1711	1 2 1
...	1662	1 7 7	...	*1712	1 3 2½
...	1663	1 6 6	...	1713	1 8 2
...	*1664	1 2 1	...	1714	1 3 2½
...	*1665	0 19 10½	George I.	*1715	1 0 8½
...	*1666	...	...	*1716	1 1 6½
...	*1667	...	...	...	...
...	1668	0 15 5½	...	*1717	1 3 2½
...	1669	0 17 8	...	*1718	1 4 10½
...	*1670	...	...	...	...

* An asterisk is placed before those years in which the country was at war.

† In the years left blank the records had either been lost or no fairs had been struck. The fairs were struck in Scots money till 1786.

Kings' Reign.	Years.	Fiars' Prices, Imperial Quarter.	Kings' Reign.	Years.	Fiars' Prices, Imperial Quarter.
George I.	*1719	£1 3 2½	George III.	*1778	£1 9 9½
...	*1720	0 19 10½	...	*1779	1 6 2
...	*1721	1 4 3½	...	*1780	1 14 9½
...	1722	1 8 2	...	*1781	1 13 1½
...	1723	1 5 11½	...	1782	2 0 9
...	1724	1 2 1	...	1783	1 16 1½
...	1725	1 12 1½	...	1784	1 18 9½
...	1726	1 5 11½	...	1785	1 16 11½
George II.	1727	1 8 2	...	1786	1 16 6½
...	1728	1 8 2	...	1787	1 17 9½
...	1729	1 6 6	...	1788	1 19 9
...	1730	1 2 1	...	1789	2 2 8½
...	1731	1 2 1	...	1790	2 2 10½
...	1732	0 17 8	...	1791	1 19 9
...	1733	0 19 10½	...	1792	1 19 0
...	1734	1 4 3½	...		
...	1735	1 7 1	...	*1793	1 2 8½
...			...	*1794	1 4 8½
...	1736	1 4 10½	...	*1795	3 19 6½
...	1737	1 3 2½	...	*1796	2 5 8½
...	1738	0 19 10½	...	*1797	1 18 9½
...	*1739	1 4 4	...	*1798	2 1 9
...	*1740	2 3 0½	...	*1799	3 8 7
...	*1741	...	...	*1800	5 9 11½
...	*1742	0 19 4	...	*1801	3 5 7½
...	*1743	0 17 8½	...	*1802	2 3 8½
...	*1744	1 5 5	...	*1803	2 7 8½
...	*1745	1 8 10	...	*1804	4 1 6½
...	*1746	1 8 2	...	*1805	2 19 7½
...	*1747	1 2 1	...	*1806	3 11 6½
...	1748	1 5 2½	...	*1807	3 2 7½
...	1749	1 5 5	...	*1808	4 3 6
...	1750	1 3 8½	...	*1809	3 15 6½
...	1751	1 7 7	...	*1810	3 9 7
...	1752	1 7 7	...	*1811	4 7 5½
...	1753	1 6 6	...		
...	1754	1 4 10½	...	*1812	5 9 11½
...			...	*1813	3 8 1
...	1755	1 5 10	...	*1814	2 15 8
...	*1756	1 13 1½	...	*1815	2 6 8½
...	*1757	1 10 4½	...	1816	3 12 6½
...	*1758	1 5 4½	...	1817	3 11 2½
...	*1759	1 1 8	...	1818	3 11 2½
George III.	*1760	1 4 2½	George IV.	1819	2 19 1½
...	*1861	1 6 6	...	1820	2 14 8
...	*1762	1 15 4	...	1821	2 14 8
...	1763	1 5 4½	...	1822	1 17 9½
...	1764	1 9 9½	...	1823	2 12 8½
...	1765	1 17 6½	...	1824	3 0 3½
...	1766	1 17 5½	...	1825	2 15 8
...	1767	1 15 9½	...	1826	2 15 8
...	1768	1 17 9½	...	1827	2 8 11
...	1769	1 13 1½	...	1828	3 9 10½
...	1770	1 9 1½	...	1829	2 9 9
...	1771	1 16 9½	William IV.	1830	2 14 3
...	1772	1 16 5½	...		
...	1773	1 17 1½	...	1831	2 18 6
...			...	1832	2 8 8½
...	*1774	1 15 4	...	1833	2 6 10
...	*1775	1 12 9½	...	1834	1 19 1½
...	*1776	1 9 5½	...	1835	1 9 6½
...	*1777	1 13 5½			

Abstract of the Average Prices of the foregoing Table, taken in cycles of 19 years, shewing the Rise and Fall per cent. on each cycle.

PERIOD.	Average Price of a Quarter of Wheat.	Rise and Fall per cent.
From 1622 to 1640	£1 12 0	
... 1641 ... 1659	1 9 10 $\frac{1}{4}$	Fall 7 $\frac{1}{2}$ per cent.
... 1660 ... 1678	1 2 3	... 25 ...
... 1679 ... 1697	1 1 0 $\frac{1}{4}$	... 5 ...
... 1698 ... 1716	1 4 0	Rise 15 ...
... 1717 ... 1735	1 4 6	... 2 ...
... 1736 ... 1754	1 5 5	... 1 $\frac{1}{2}$...
... 1755 ... 1773	1 11 6	... 24 ...
... 1774 ... 1792	1 16 11	... 15 ...
... 1793 ... 1811	3 2 1	... 72 ...
... 1812 ... 1830	3 0 5	Fall 2 $\frac{1}{2}$...
... 1831 ... 1835	2 4 6	... 25 ...

ACCOUNT OF THE TURNIP SAW-FLY (*ATHALIA SPINARUM*).

By JAMES DUNCAN, M. W. S., &c. &c.

THE extensive injury done by this insect, in the course of last season, to one of the most valuable of our green crops, renders it highly desirable that its natural history should be carefully investigated, as it is only by so doing that an effectual remedy is likely to be discovered against its depredations. As it is at all times rather a common fly in many parts of the country, it probably commits more or less damage every summer, without attracting much attention; and circumstances may speedily recur equally favourable to its superabundant increase as on the preceding season.

The group of hymenopterous insects to which it belongs appears to have been very little studied by the naturalists of this country, at least their investigations have not been made public. There is, accordingly, no work to which the English reader can be referred for a satisfactory account either of their general history or the distinctive characters of the genera and species. Most of the other primary divisions of our indigenous insects have of late years been amply illustrated both by descriptions and figures, and it is to be hoped that a comprehensive account of that section of the Hymenoptera named *Terebrantia* by Latreille, will not long continue to be a desideratum in our ento-

mological literature. It comprehends many species which are but imperfectly known, and others deserving of attention on account of their curious habits and economy, as well as the ravages they frequently commit on the produce of our fields and gardens. Many accurate observations, however, on these insects have been recorded by the continental naturalists, De Geer, Reaumur, Jurine, and others of more recent date, so that our acquaintance with the history of several of them may be regarded as pretty complete. Before proceeding to give a more detailed account of the turnip saw-fly, which has suggested these remarks, it will be useful to describe briefly some of the general properties which it possesses in common with the rest of its tribe.

They are named *saw-flies* from the use and appearance of the instrument with which they deposit their eggs. It is placed at the extremity of the abdomen of the female on the under side, and is so constructed, that it combines the properties of a saw and auger. Under the microscope, it is found to be composed of two separate pieces, tapering to a point and curved, having the concave side set with a row of fine teeth, which are themselves serrulated. Each of these saws has another piece behind it, for the purpose of giving it support, with a groove to receive it, in which it moves backwards and forwards. Although short and inconspicuous, so as scarcely to be seen except when the abdomen is pressed, this instrument is entirely analogous in its structure and functions to the ovipositor which is so highly developed in the slender-bodied wasp-like flies, named Ichneumons, as frequently to exceed the length of their bodies,—a peculiarity rendered necessary in their case by their parasitical habits, which often force them to explore the depth of holes and crevices before they can convey their eggs to an appropriate nidus. But, in the saw-flies, it is only required to pierce a small hole in the branches or other parts of vegetables, which the structure just explained is admirably fitted to accomplish. Sometimes the eggs are placed within the woody substance of the branches of shrubs, but more commonly they are attached to the leaves. An instance of the former sort is observed in the rose saw-fly (*Hylotoma Roseæ*), and a familiar example of the latter in the species which infests gooseberry and currant bushes, which arranges its eggs in rows

along the midrib and principal nervures of the leaves. In all cases the eggs are not long in being hatched, and the young larva generally finds its congenial food in the leaves on which its provident mother had placed it.

These larvæ are called *false caterpillars*, from the general resemblance they bear to the larvæ of butterflies and moths, to which the name of caterpillar is properly restricted. A very slight examination, however, soon shews decided marks of distinction. Caterpillars properly so called have never more than sixteen feet, while the larvæ of saw-flies have generally from eighteen to twenty-two; a few have only six, a circumstance which again distinguishes them from true caterpillars, in which the number of these organs is never below ten. Another mark of distinction is afforded by the structure of the feet. In lepidopterous larvæ the abdominal legs are surmounted by a coronet of small hooks, which is never found to be the case in those of false caterpillars, as they are simple mammiform protuberances. This minute difference, which can only be detected by the microscope, has, however, a material influence over their habits, and often enables us to distinguish between the respective kinds at first sight. The coronet of hooks converts the membranous or abdominal legs of caterpillars into efficient instruments of prehension, and they accordingly fix their body by means of them to the plane of position, while the head and anterior part remain free. The abdominal legs of the others, on the contrary, are mere points of support, incapable of clinging to an object, and the larva, consequently, fixes itself by its pectoral or fore-legs, which are much developed for the purpose. The whole of the abdominal portion of the body is thus left at liberty, and it is either borne curved inwards (as in the gooseberry saw-fly), or projects into the air in variously-contorted and singular postures, as is remarkably the case with the willow saw-fly (*Nematus Capræ*) and the larva of *Hylotoma Rosæ*, which has the extremity of its body almost always raised and curved in the form of the letter S. Additional distinctive characters might be mentioned, such as the form of the eyes, which are pretty large in the pseudo-caterpillars, and placed one on each side of the head, while in true caterpillars they are small, almost invisible, points disposed in a circle; but these will suffice to distinguish the two tribes,

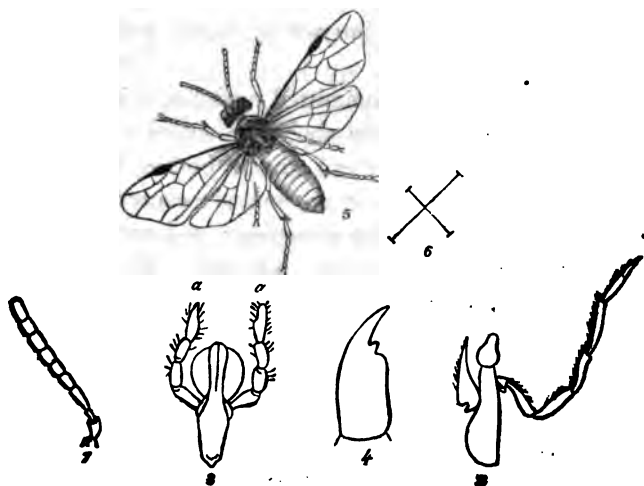
which it is of importance to be able to do, as they are often associated together in the work of destruction.

The body of pseudo-caterpillars is generally composed of twelve segments, but the incisures are indistinctly defined, and liable to be confounded with the transverse wrinkles which thickly cover the whole surface. Many of them are marked with bright and varied colours, but the majority are of one colour. In this respect they often undergo a remarkable change after they have cast their last skin, the colour becoming entirely unlike what it was before, so that it is impossible to recognise the same individual. This change, indeed, extends even further than to colour, for such kinds as are furnished with tubercles or spines in their earlier stages, lose them at their last moult and become smooth: that of the gooseberry species, for example, loses the black tubercles which made the surface appear as if shagreened. Like the flies which they produce, these larvæ are sluggish and inactive, seldom moving from the place where they fix themselves, unless when requiring an additional supply of food. When not engaged in feeding, or when apprehensive of danger, most of them roll themselves into a circle, sometimes with the tail elevated in the centre. The greater number live exposed on the foliage of plants, but others take up their abode in the interior of the slender shoots, and feed on the immature pith: others lodge in the interior of fruits, and cause them speedily to decay.

Instances of the ravages committed by different kinds of these creatures, are to be observed in abundance every summer. The defoliation of our gooseberry and currant bushes, by the species formerly alluded to, is almost an annual occurrence: willows and poplars often undergo the same fate; and various kinds of fruit-trees have their appropriate assailants. We have now to speak more particularly of the species which attacks the turnip.

It is somewhat surprising, and a proof of the little attention paid to entomology in this country till of late years, that although this insect has often appeared in great numbers and done proportionate injury, it is only recently that it has been described in such a manner as to render it recognisable. It was known, however, to Fabricius, who named it *Tenthredo spinarum*, and likewise to Panzer, in whose nomenclature it is designated *T*

thredo centifoliæ. Neither of these names seems very appropriate, but the former ought to be retained as having been first applied to it. The genus *Athalia*, to which it is referable in modern systems, was established by Dr Leach, and contains about five other species besides the present. It is distinguished by the following characters: *antennæ* short and somewhat club-shaped, nine or ten jointed in the male (but generally with the appearance of eleven joints in the female), the radical joint slightly thickened at the extremity, the second shorter and ovate, the third as long or longer than any two of the other joints taken together, the remainder decreasing somewhat in length to the terminal one, which is large and ovate (Fig. 1.): *maxillary palpi* long, six-jointed, the radical joint shortest, the sixth more slender than the rest, and somewhat spindle-shaped (Fig. 2.): *labial palpi* four-jointed, the joints nearly of equal length, the terminal one having the apex excavated on the inner side (Fig. 3, a a): *mandibles* thick at the base, terminating in a curved claw with a tooth or slight notch on the inner edge (Fig. 4.); *maxillæ* with two lobes, one of them of an ovate shape at the extremity, the other long and pointed, projecting from the inner side (Fig. 2.): *superior wings* with two marginal and four submarginal cells.



The structure of the parts just described, will be found to distinguish this insect generically from all the groups most

closely allied to it. We now proceed to describe the species, which it is necessary to do with some minuteness, as there are others so nearly resembling it, that they may easily be confounded with each other.

ATHALIA SPINARUM.

Leach, St Farg. Curtis, British Ent. pl. 617.—*Tenthredo spinarum, Fabr.*—*Tenth. centifoliæ, Panzer.*—*Athalia centifoliæ, Yarrel, Zool. Trans.*

Head wider than long, deep black, with three ocelli in the centre; eyes oval; antennæ black above, and for the most part dull yellow beneath; labrum and palpi light yellow; thorax black above, with a triangular space in front, the scutellum and a spot behind it reddish-orange; the collar, which is rather long and slender, black on the sides and yellow in the middle: abdomen rather short, entirely orange-yellow, inclining to red, with a small black spot on each side of the first segment: legs likewise orange-yellow, the tarsi paler approaching to whitish, the tip of the tibiæ and of each of the tarsal-joints black; the tibiæ with two spines at the apex, and the joints of the tarsus each with a very slender lobe beneath: extremity of the ovipositor black: wings yellowish at the base, the costa and stigma black. Length 3—3½ lines (exclusive of the antennæ).

Several slight varieties occur. In many specimens the thorax is entirely black above, and the scutellum is frequently of the same colour.

The flies which appear in the early part of summer, and deposit their eggs on the young turnip-plants, have probably survived the winter under ground in the pupal state, enveloped in their cocoon. Emerging from this, as soon as the milder weather is confirmed, in their winged state, the females immediately lay their eggs, after which they very soon die. We are not aware whether any other plant than the turnip is ever selected for this purpose, but as it has been asserted that the larvæ have been seen feeding upon the charlock (*Raphanus raphanistrum*), it is not improbable that the eggs are sometimes attached to it, or even to others of the *cruciferae*, as many of these plants are very closely allied to each other both in outward appearance and in chemical properties. The eggs appear for the most part to be placed round the outer margin of the leaf. In favourable weather they are hatched in a short time, and the young li

immediately commences its attack on the plant. At first these larvæ are of a deep black colour, and of course small size; but they grow rapidly, and in the course of a few weeks attain their full dimensions. In the course of their growth they change their skin several times, and most of these moultings are attended with a slight change in the colour. After casting their last skin, they are of a dark lead or slate-grey colour, paler beneath, and having a light coloured stripe along each side of the body just above the legs; this, however, is often very indistinctly defined.* Like most of the other larvæ of their tribe, when touched or in any way disturbed, they coil themselves up, and remain motionless.

These larvæ, like all others known by the name of caterpillars, whether false or true, have six forelegs or pectoral legs, by means of which, as already intimated, they adhere to the leaf. They have fourteen membranous legs, of a conical shape, on the abdomen, and two others at the hinder extremity. The principal organs in the head are two short conical antennæ, and two strong mandibles, with the latter of which they cut and macerate the leaves. Besides these there is a spinneret, or instrument for forming silk, the use of which will be immediately alluded to.

When full grown, the larvæ cease to eat, and allow themselves to drop from the plant that nourished them to the ground, in which they usually bury themselves; or they take shelter among rotten leaves, moss, &c. When examined after a short time, they are found to be completely enclosed in a cocoon, composed of two distinct layers of silk, which is spun for the purpose in the same way as in caterpillars. The outer layer is of a coarse texture, and encloses externally particles of earth and other substances, which are attracted both by the viscosity of the silk itself, and an exudation from the body of the larvæ.† Within this there is another layer of very fine silk, forming a

* Mr Curtis states that they are sometimes *green*, a colour which we never saw them assume, for in general they are not liable to much variation in this respect.

† This exudation appears to be simply the escape of superfluous moisture from the body, necessary to give a certain consistency to the new organs just about to be developed; but its secondary use seems to be that just alluded to. It was very obvious in some larvæ kept in confinement last summer, making the body appear as if sprinkled over with small drops of dew.

smooth and compact lining to the whole of the interior. This silk is of a fine satiny lustre, and when the cocoon is opened it appears as if it had been washed with a solution of silver. When the fly is fully matured, it makes its exit by gnawing with its mandibles a hole in one end.

The larvæ are known in different parts of the country by the names of Black Caterpillar, Blacks, Nigger, Canker, &c. From the notices that have been published, they seem to have been abundant last season over the greater part of the kingdom, although certain extensive districts, from causes which it is impossible to appreciate, have been altogether exempted from their unwelcome visits. They were particularly abundant in several of the border counties of Scotland, and even more so in Kent, Norfolk, and many others of the southern counties of England. The loss they have occasioned to farmers must be very considerable, but data cannot easily be obtained to form an estimate of its amount. In some instances the crop was wholly destroyed, and where the caterpillars were less numerous the injury they occasioned to the plant appeared in the diminished size of the bulb, its vegetative functions being impeded by the partial consumption of the leaves.

A belief at one time pretty generally prevailed, that they did not attack the Swedish turnip, and they certainly seem less partial to that plant; for, on examining a field in which Swedes alternated with the ordinary kind, the caterpillar was found much less plentiful on the former, and in many places did not appear at all. Mr Coke of Holkham, however, lost last season upwards of 200 acres of Swedes by them, and that plant by no means escaped in other parts of the country. They are said, likewise, to have attacked the mangel-wurzel, but this seems not at all probable.

Unhappily it is more easy to describe their depredations, than to suggest an efficient remedy of easy application. A distinguished delineator of insects, who has published a beautiful figure of the fly, expresses his belief that it is not difficult to destroy them, "for, if they are brushed off the leaves, it seems they are unable to crawl upon the ground and recover their station; they consequently perish unless they are full grown at time; but as there is a constant succession from August till November, the operation of drawing a hurdle or something over

the turnips ought to be repeated at intervals during that period." * Of course this method can be effectual only on the supposition that the caterpillar is unable to crawl—it might have been presumed, however, that it did not receive such a complement of legs merely as a matter of form, and accordingly the slightest observation shews that it can move about with facility. Much benefit has sometimes resulted from turning as many ducks as could be collected into a field infested with the caterpillar, as they devour it with great avidity, and are said to grow speedily fat on such fare. Where this plan has been tried, it has been found useful to make boys brush the plants with a branch, by which the insects are thrown on the ground, where they are more easily observed and devoured. In several parts of Roxburghshire, young people were employed to pick them off with the hand; and as they are very difficult to seize with the fingers, a large pin was frequently used to lift them. When a considerable quantity have been collected in this way, one of the methods sometimes resorted to in order to destroy them was to bury them in the earth. From what has been already stated regarding the natural history of these creatures, it will at once be perceived that such a treatment would enable many of them to escape uninjured; for such as were full grown would speedily be transformed into chrysalides, a state which they never assume without doing voluntarily what was thus forced upon them. A case similar to this is mentioned by a German author, who states that the gardeners and country people once collected great quantities of the destructive caterpillar of the cabbage moth (*Mamestra Brassicæ*) and buried them; which, he justly observes, is just as if we should endeavour to kill a crab by covering it with water.

The turnips have often been sprinkled with lime and saline mixtures, without effect; arsenic has also been dredged on them, by way of experiment, but when it destroyed the insect, it proved, as might have been expected, equally fatal to the plants. Nearly the same thing may be said of a plan, very often adopted, that of drawing a roller over the field, because it materially injures the foliage, and probably destroys very few of the caterpillars, especially in a loose soil.

Perhaps the most effectual preventive would be to employ a

* Curtis's British Entom. 617.

few persons to kill the fly when it first appears in the early part of summer, and before it has deposited its eggs. In such a case, the death of an individual would be equivalent to the destruction of an entire colony afterwards, for the number of eggs laid by every female is very considerable. The flies could be very easily caught, either by means of a small bag-net, similar to that used by entomologists, or even by the hand, for they are very sluggish and inactive, seldom flying rapidly or to a distance. So much is this the case, that a celebrated French observer describes them in the following rather curious terms: "Toutes ont un air assés lourd, elles sont peu farouches, elles se laissent approcher, et même elles se laissent prendre, elles semblent sottes. Nous verrons bientôt que nous devons être contents de leur espèce d'imbécillité;"* a statement which will be readily admitted if it can be made available for the purposes mentioned. Many might likewise be destroyed with ease by searching for the pupæ; and a little observation would soon enable a person to detect the kind of retreats which they are in the habit of preferring. The ploughing of a field in winter no doubt kills numbers, by exposing them to the frost and to the eager eyes of the feathered tribes; but this is not so destructive as might be supposed, for they can resist a great degree of cold, and the furrow covers many as effectually as before; at the same time it is probable that they are less numerous in the open field than at the roots of hedges and old trees, where the soil is not liable to be disturbed. When the caterpillars have actually appeared, by far the most easy method of collecting them seems to be by employing a large net, similar to that figured and described by Mr Kirby † as having been used by a Norfolk agriculturist to clear his turnips of the *Haltica nemorum*.

This net is of considerable depth, of a triangular shape at the opening, the sides being formed of two shafts, diverging from the handle, and turned up at the extremity like a golf-club, in order that they may slide easily along the ground. The cross bar in front is placed at some distance from the ground, that it may not come in contact with the plants too near the root. It is designed to be pushed before the operator pretty smartly, and by brushing the leaves of the turnips in its passage, will displace

* Reaumur, *Memoires pour l'Histoire des Insectes*, v. 107

† Introduction to Entom. iv. 517, pl. 24, fig. 3.

the caterpillars, and generally cause them to fall into it. This implement has been used with advantage to collect the *Halicta nemorum*, and there seems no reason why it should not be equally successful in the case of other insects.

Owing to the great profusion of these insects last season, from whatever causes it may have arisen, it might naturally be supposed that they would be equally plentiful, or even more so, for some years to come. But this inference is by no means justified by what is observed in analogous cases; it may even happen that their numbers are more than usually small. The sudden increase and diminution, without any appreciable cause, of many of the lower animals, particularly insects, to a degree in some instances which is altogether astonishing, is one of the most mysterious and perplexing considerations that attach to natural history.

Last season was by no means the first time that these insects increased to a hurtful extent. They appeared in 1806, 1818, and in the summer of 1835 they were nearly as numerous and destructive in some districts as they were last year. Their ravages have likewise been recorded at a much earlier date than any of these just referred to, as will be seen from the following account.

"About twenty years ago," says a writer in the *Philosophical Transactions*, vol. lxxiii. "the whole country was nearly stripped; and this year (1782), it has been subjected to a similar fate. Many thousands of acres, upon which a fairer prospect for a crop of turnips has not been seen for many years, have been ploughed up; and as, from the season being now far spent, little prospect can be expected from a second sowing, the loss to the farmers individually will be very considerable, and to the country immense.

"It was observed in the canker year above mentioned, that, prior to the appearance of the caterpillar, great numbers of yellow flies were seen busy among the turnip plants; and it was then suspected that the canker was the caterpillar state of the yellow fly; and since that time it has been remarked that cankers have regularly followed the appearance of these flies. From their more frequently appearing on the sea-coast, and from the vast quantities which have, I believe, at times been observed on the beach washed up by the tide, it has been a received opinion

among the farmers, that they are not natives of this country, but come across the ocean ; and observations this year greatly corroborate the idea. Fishermen upon the eastern coast declare that they actually saw them arrive in cloud-like flights ; and from the testimony of many, it seems to be an indisputable fact that they first made their appearance on the eastern coast ; and, moreover, that on their first being observed, they lay upon and near the cliffs so thick and so languid, that they might have been collected into heaps, lying, it is said, in some places two inches thick. From thence they proceeded into the country, and even at the distance of three or four miles from the coast, they were seen in multitudes resembling swarms of bees. About ten days after the appearance of the flies, the caterpillars were first observed on the under side of the leaves of the turnips, and in seven or eight days more the entire plants, except the stronger fibres, were eaten up. A border under the hedge was regularly spared until the body of the enclosure was finished ; but this done, the border was soon stripped, and the gateway and even the roads have been seen covered with caterpillars, travelling in quest of a new supply of turnips ; for the grasses, and every plant except the charlock (*Sinapis arvensis*), they entirely neglect, and even die at their roots without attempting to feed upon them. This destruction has not been confined within a few miles of the eastern coast, but has reached more or less into the very centre of the county (Norfolk). The mischief, however, in the western parts, and even on the north coast, has been less general ; but I am afraid it may be said, with a great deal of truth, that one-half of the turnips in the county have been cut off by these voracious animals."

In reference to the above account, it may be remarked that it was long a popular opinion, that most of our destructive insects came from over-sea, as this was an easy way of accounting for their rapid increase, which could not be done on any other supposition. But as this writer positively asserts that they were seen to arrive in extensive flights, it is possible, as has been remarked, that they may have passed over from Lincolnshire to Norfolk. Even this was a long flight for insects of such inert habits, and it could only be a case of great necessity that led them to attempt it.

ON THE PAST AND PRESENT STATE OF HORSES.

A Comparative View of the Form and Character of the English Racer and Saddle Horse, during the last and present centuries. Illustrated by eighteen Plates of Horses.—London: Thomas Hookham, 15 Old Bond Street. 1836.

WE owe an apology for our apparent neglect of the author of this elegant volume. This explanation will convey it. We expected a knowing article from the pen of a correspondent conversant in the history of the English racer, but were disappointed till we could no longer delay when about to conclude our volume.

The main object of his work, the author informs us in the introduction to his handsome volume, is to investigate the results of that structural enlargement of animals which is unnatural, and to point out those properties which may be acquired by certain of them when fully reclaimed, and those which they are likely to lose in this condition. The investigation becomes of vast importance when the character of our race-horse, and of this country as the nursery of the finest horses in the world, is involved in the question. That such an investigation is required, not only at the hands of our author, but of Parliament, we may be convinced from the melancholy fact, that our once noble and matchless race of race-horses, the boast of the country and the envy of the civilized world, is degenerating, and will degenerate still farther, if some immediate and efficient means, such as those pointed out by the author, be not adopted to arrest the progress of the evil; and what constitutes an aggravation of the evil, is, that it originates in the avarice and cupidity of our own countrymen, and in that portion, too, who of all others in their conduct ought to be actuated by higher and purer motives. Instead, as in years bygone, of emulating with generous rivalry, and prosecuting with laudable zeal the running and breeding of race-horses for their own noble qualities, the sole object of the "turf" now-a-days seems to be to win heavy stakes, regardless of the animals which are used as the instruments of avarice. The race of the day is run, and the successful competitor is perhaps never more heard of. This is a serious but not rash accusation; it is completely proved and

amply illustrated by our author by examples which cannot be controverted. A comparison of the racers of the last century with those now in vogue displays a superior fulness of form, and just that which we might expect to find at a time when the tasks performed demanded a fine union of speed, stoutness, and structural powers. The race-horses of the middle of the last century, such as Sedbury, Old Partner, possessed compact bodies, capacious chests, powerful stifles, fine limbs, and general bearing. The racers of a later date, such as Mambrino, Sweetbrier, Sweet-William, acquired properties even more valuable than their predecessors. To a capacious chest and compactness of body, they united strong loins, well inclined and long shoulder-blades, covered with a great mass of fine muscle, muscular arms, and strong joints. The speed of the later horses were increased whilst the muscles escaped coarseness, and the constitution maintained its vigour. Approaching towards the termination of the last century, the properties indicative of increased speed were evolved in such horses as Sharke, Johnny, and Gimcrack. Their chests were capacious, ribs finely hooped, shoulder-blades had a good inclination and great length, having a mass of muscles on the arms and withers, and the quarters, the placing of the hind feet, large pastern joints, and back sinews, all admirable. Approaching still nearer to our own times, at the commencement of the present century, to the days of Muly Moloch, Selim, and Pericles, we find a form still more favourable to speed, by a decided elongation of the skeleton. In form, however, these horses were superior to those who succeeded, but inferior to those who preceded them. They displayed longer backs, longer and heavier limbs, less muscle, smaller sinews, and sharper withers. They came too late in the period of the turf to perform the tremendous work of their predecessors, who used to run six miles carrying eight stones, and heats of four carrying twelve stones. The tasks had been much diminished ere they appeared to public view. From that period to the present racers have lost much of their vigour and stoutness, and their structural development has been entirely promoted for one object—speed. Heavy stakes, and lowering the standard of running from heats to a single run of short distance, have been the consequences of unfortunate changes; whilst the continuance of these conditions has been the cause of

perpetuating them. The result has been exceedingly unfavourable to the character of our racers and saddle-horses, producing weediness and disposing them to coarseness. The long back, flat sides, long limbs, weak loins, delicate constitutions, and strong disposition to local and hereditary disease of the modern racer and saddle-horse are inadequate substitutes for the short back, short limbs, capacious chests, full sides, and muscular character of the old racer and hunter. Speed and weakness are no compensation for loss of vigour and stoutness.

But the degeneracy of the race-horse is an evil not alone affecting itself—it is permitted greatly to influence the character of our saddle-horses. Farmers cannot breed saddle-horses without the aid of the racer, and yet over the quality of this animal they have no control. As may be expected, the offspring displays many of the bad characteristics of the parents. Hence farmers will not largely enter into the breeding of saddle-horses; they consider it subordinate to every other business of the farm, because they have no reliance on the excellence of the racers' offspring; and they pay little attention to a matter which produces a precarious return. Besides, they least understand a branch of their profession which requires the greatest science in its management. Need we, therefore, wonder that such hunters as Spankaway and Mr Mickleshwaites's are not to be obtained for love or money at the present day!

The author's eulogiums on the figure and character of the old racers, are fully supported by the well-executed figures which he has given from the portraits of those celebrated animal painters of their day—Seymour, Stubbs, and Marshall. They are all apparently good drawings from the originals, and beautifully lithographed. Not to appear hypercritical, we should say the portrait of Protector is out of drawing. When so much of the counter and face are seen at a side view, it is impossible, in perspective, that the hind legs could be so near the lower edge of the plate as is represented. This, of course, is not the error of old Stubbs, whose acute eye could trace so minutely the lineaments of the face of the horse. Interesting as is the consideration of the past and present condition of the race-horse, we have not space to devote to the investigation of the rationale of the

subject as treated by our author. We must content ourselves in giving an extract from the author's recapitulation of his own arguments.

"The reader has seen that a change of form in our racers was quickly followed by a corresponding change in the nature of the running; that when the forms of the animals had ceased to be compact, the distances were shortened, and the weights lightened. It has been shewn by what expedients the breeders for the turf have maintained a good quality of muscle in the modern race-horse; the accompanying plates prove, however, that the older horses had more muscle on a specific surface of bone than the modern ones; this fact is farther corroborated by the inability of the modern racer to carry the old weights. It is obvious that the interest taken in the turf by those who breed for it, in no degree depends upon the nature of the tasks performed, or on the merit of the horses as a race. The sole object of every individual breeding for the turf is to win races, be the nature of them what it may; each of these breeders, therefore, looks to the present rather than the future. There can be little doubt that the tasks performed by the old race-horses were adjusted to their strength, and that the change in the running was the consequence of diminished power in the breed. It has been said that the modern racers are equal to running the old distances; but the intense distress they exhibit when occasionally made to run a single heat of four miles, with a light weight on their backs, leaves no doubt that their stoutness is diminished. Their inability to carry weight is yet more sensible; it is not only shewn by the change in the running, but by the want of muscular power in the greater portion of our saddle-horses, which have enough of racing blood to secure good action. While it is admitted that the form of the saddle-horse should be compact and powerful, this class has become so rare as to obtain in the market an extravagant price. It is impossible to suppose, whilst the racer exercises its present influence over the character of our saddle-horses, that these can be powerful and compact while the former is the reverse.

"If the reader agree with us in concluding, that it is the natural qualities of the racer, such as his form and vigour, which have become defective, and not any acquired property, like that of speed, he has now to determine whether the remedy we propose be the proper one. It rests on this foundation,—that, as the properties which have become defective are natural ones, we must recur to the source where those properties are found in perfection. The intelligent reader must perceive that the great size so much admired by the public in brood mares has been acquired. If these large mares produce the animals we want, they suit our purpose: if they fail to do this, they must labour under some defect which is not altogether of a material character; some higher property has become defective, which can only be repaired by recurring to more natural animals. These we can always render large, by means of richer food than nature affords; but natural properties can only be renovated by recurring to their source. We find the symmetry of the skeleton in the enlarged horse best adapted for useful purposes, when it diverges least from that which is natural, from that form which we call compact. Horses which are able to traverse a great dis-

tance rapidly and frequently, with a considerable weight on their backs, display this form. This, like stoutness, is an effect, and one which nature only can produce. Large horses can only be reared on very unnatural food; they are less stout than small ones under exertion, take more time to recover from this, and do not carry weight so well; in other words stoutness, and the power of carrying much weight for a long distance at a rapid rate, are not dependent on the comparative weight or surface of the muscles; but on a sufficiency of muscles; united with that distribution of the skeleton, which, while it denotes vigour, is mechanically adapted for fine action, and for carrying weight. The reader has seen how dependent are our saddle-horses upon our race horse, and why no private individual breeding for the "turf" has recourse to fresh blood. This, to be of permanent service, must be in great amount; in other words, the number of the animals must be great to admit of sufficient choice, and to avoid too close alliances of blood. No individual can long maintain a breed of horses in any thing like perfection, if, after taking some years to form a new race, he is to be sufficiently remunerated by letting out or selling stallions at a high price; the breed becomes ruined by its numbers being too small. A fine race of horses may be formed, but it cannot be long maintained, unless its number be great, and fresh blood often had recourse to. . . . The English racer, we cannot doubt, acquired his enlarged structure by rich food, and his unnatural speed under the operation of continued selection for that property. If our ancestors were able to exercise this power over nature, and if we have the same power, is it not worth our while, now that our horses have become so much deteriorated for useful purposes, to try if we cannot farther carry out the system of those who originated the 'turf,' by making the principle of continued selection applicable to a union of properties, rather than to one property? If the standard be discreetly chosen for testing a race of horses, being such as they can go through without distress, should this standard be afterwards lowered because the power of the racer becomes afterwards diminished? If not, and if experience proves that private individuals do lower the standard by which their horses are tested, rather than put themselves to trouble and expense incompatible with individual interest, ought we not to endeavour, in this special case, to effect, by means of a *national establishment*, that which experience shews is not likely to be effected by individuals? Nothing, it is clear, can long maintain a fair union of properties in these animals, but a test discreetly chosen and steadily maintained. That selected by our ancestors, and continued down to the middle of the last century, was sufficiently searching, it only required to be fixed. The long time the earlier horses remained on the turf proves the greatness of their vigour, and the fine condition of their limbs. It is notorious how quickly the limbs of the modern racer give way: a single race, nay a preparation for one, often makes them break down. Had the old standard been steadily maintained by which our early racers were tested, the modern ones would not have been permitted to deteriorate in respect to qualities which, being natural, could be renovated by a recurrence to nature. The modern racer has not lost speed; he is swifter than the earlier horses, but he has no longer that form and those qualities which denote sufficient vigour. If we once ascertain the full extent of vigour be-

ing to horses of the best race, in an almost natural condition, if in engrafting gradually on such a race the acquired properties we want, we observe narrowly the minutest loss of vigour which may from time to time be developed, we shall soon ascertain by a mass of facts carefully recorded, how much of this animal's natural vigour can be united with the necessary amount of artificial speed or artificial structure. The moment a new race of horses, formed after this manner, has acquired sufficient speed and structure, while maintaining sufficient vigour, our standard for testing this union of natural and acquired properties should be at once erected, and ever afterwards steadily maintained. This at least should be the course pursued with the horses bred within the precincts of a national establishment. Here, the animals which did not come up to the standard once fixed upon for testing the race, should be drafted, and if the evil pervaded the whole of the enlarged stock, this should be renovated by a cross with the smaller animals kept in reserve for the purpose. We have been led to suggest a plan for the management of some of our native ponies, by the small number of the animals left now to choose from. If frequent recurrence to horses nearly in a state of nature be beneficial, the quality of them should not be allowed to deteriorate. In keeping a considerable number of well selected native ponies in a pure state, as respects race, while submitting them to the influence of continued selection, we should place them in the situation of our moor sheep and hardy Scotch cattle, which, though nearly in a state of nature, and living on the poorest pasturage, are yet subjected to a system of continued selection. To these small but admirable animals we are compelled to recur, when our more factitious sheep and cattle have become too delicate. Under the plan now proposed, none of our native ponies would be enlarged, or withdrawn from their miserable pasturage, unless their form and action were good, the only change then effected would be a pasturage a little better. Any farther enlargement would be made to depend upon the manner in which they had been found to bear the preceding one. This plan, though simple and cheap, would, after a few years, be followed by consequences highly beneficial; we should derive from it practical information which cannot be procured by any system less comprehensive; and if nature be the source to recur to, when the natural propensities of factitious horses are deteriorated, those who breed our saddle horses would find that done for them, which we have reason to conclude they will never do for themselves. The reader is called on practically to determine whether our race-horses are deteriorated in respect to useful and national objects, and if so, whether the properties which have become defective are natural or artificial ones. If he conclude that their natural properties are deteriorated, he will probably admit that Nature is the only source to recur to for a remedy."

Our author instances the practice of the breeders of Herefords and Devons, who have continued so long to produce large oxen from small cows with little loss of either hardness or activity; and condemns the theory of Mr Cline, who maintained the ne-

cessity of breeding from large cows. Mr Cline's theory is not founded on fact, for ordinary-sized cows of every breed, meaning ordinary to be relative to the natural size of the breed, produce the finest stock, and large bulls are not requisite for producing fine stock, provided they are of fine quality. But it should be borne in mind that Mr Cline lived at a period when it was generally believed by breeders, that the female had the greatest share in imprinting properties on the offspring, and of course he naturally wished to support the prevailing opinion by theory, whereas it is now universally admitted that the male exercises the greatest influence on the offspring. It should also be remembered that castration has a considerable influence in enlarging the structure of animals, so that whatever may be the size of the parents, the emasculated progeny will always be larger on the same kind of food. In his remarks on breeding cattle, our author inscribes two paragraphs which we cannot reconcile. At page 10 he says, "*The richest pasturage in England on which cattle are reared lies on our north-eastern coast.* Here the old short-horns, so many of which came annually to supply London with milk, were bred. They were large, long, and coarse in the limbs, delicate and ill-shapen, requiring at all times expensive food, and fattening slowly; they gave a large quantity of milk, but this yielded little of either curd or butter. This race has been renovated within a few years by a cross with a hardier breed, with one in a more natural condition, and the produce is known by the name of the new '*short-horns.*' This race is a great improvement upon the old one, and *has spread itself through nearly all our dairy counties;*" whilst at page 16 he says:—"With one exception, every breed of grazing cattle in the three kingdoms is reared on either bad or indifferent pasturage. The *Durhams* are the only grazers we possess which are *reared on rich pasture.* This is a new variety inferior to the Herefords, though more costly to rear. It is handsome, and, when supplied with rich food, the animals become very fat. *This race is confined to a small portion of the kingdom, and there is no prospect of its extending further.*" We have italicised the words in the two sentences just quoted which to us appear contradictory. What are the Durhams but new short-horns? Did not Mr Charles

Collings originate the new short-horns, and did he not originate them in the county of Durham ?

Our author devotes three chapters to the mounting and arming of our cavalry, and military punishments. These are subjects foreign to us, yet, having been a cavalry officer, as he himself informs us, our author's opinion on them are entitled to consideration. Indeed, this is the portion of the work which he has evidently written *con amore*. It is entirely free from that quaintness which obscures, and sententiousness which disjoins, the sentiments of the former part of the treatise on the horse. His sentiments on military punishments are expressions of the most rationally humane feelings.

We cannot resist copying extracts from a highly interesting private letter of that accomplished traveller Burckhardt to Mr Sewell of the Veterinary College, London, which is given in an appendix by our author. It will correct many popular notions respecting the numbers and character of the Arabian horse. Here it is, and with it here an end of the article.

“ It is a mistaken belief that Arabia is very rich in horses. The breed of horses in that country is limited to the extent of its fertile pasturing districts, and it is in these parts only that breed prospers, while the Bedouins, who are in possession of poor ground, seldom do possess any horses. We therefore see that the tribes richest in horses are those who dwell comparatively in the fertile plain of Mesopotamia, on the borders of the Euphrates, and in the Syrian deserts. It is there that the horses can feed for several spring months upon the green grass and herbs of the valleys and plains, produced by the rains, which seem to be an absolute requisite for its reaching to its full vigour and growth. Horses are much less numerous in Redjed, than in the afore-mentioned parts, and become scarce the more we proceed to the south. In the Kedjat, in the mountain of that country, and from thence towards Yemen, few horses are seen, and those few are imported from the north. The Atenne tribes of the frontiers of Syria have from 8000 to 10,000 horses, and half that number belongs to other small tribes roving about in the same province. The single tribe of Arabs Montefek, in the desert watered by the Euphrates, between Bagdat and Bassora, has, at a moderate calculation, 8000 horses ; the tribes of Dhefye and Beni Thamer, in those quarters, are rich in horses in proportion ; while the aggregate number of horses of Redjed, Diebel, Hamac, and Rasyne, viz. from near the Persian Gulf, as far as Medinn, is at most 10,000. The large tribes on the Red Sea, between Akaba and Mekka, and south and south-east of Mekka as far as Yemen, have very few horses, especially those of the mountains. In the eastern plains, beyond Beeche and Redjran, more horses are met with. The tribe of Rantan, who live in that quarter, is celebrated for its studs, and so are the Dowasen. The inhabitants of the Redjan and Yemen themselves are seldom in the habit of keeping any ; and I b

not from truth to err, in admitting 5000 or 6000, are the farthest number in the country, from Akaba, on the north point of the Red Sea, southwards to the shores of the ocean at Nadrament, comprising the great chain of mountains and the level ground on the west of it towards the sea. The hot climes of Omar are likewise said to be little favourable to the race, and horses are still there scarcer than they are in Yemen. In affirming, therefore, that the aggregate number of horses in Arabia, as bounded by the Euphrates and Syria, amounts to almost 50,000, a number much inferior to that found in Europe or any other parts of Asia upon an equal extent of ground, I am confident I have not underrated them.

"The richest country in this part of the East appears to be Mesopotamia: the tribes of Curdes and Bedouins, in that quarter, very likely possess more horses than all the Arabian Bedouins together, for the richness of their pastures easily propagates their studs. The best pasturing places of Arabia not only produce the greatest quantity of horses, but likewise the best and most chosen breeds. The finest Kubeys of the Khomh are met with in Medjid, on the Euphrates, and in the Syrian deserts; while in the southern parts of Arabia, and especially Yemen, no good breed of horses exist but those imported from the north. The Bedouins up the Redjan have very few horses, their strength consisting in camel riders and foot soldiers armed with matchlocks only. In the tract between Mekka and Medina, between the mountains and the sea, a distance of at least 260 miles, I do not believe that 200 horses can be found, and the same proportion of numbers is to be remarked all along the Red Sea from Yemba up to Akaba. The united army of all the southern Wahabee chiefs who attacked Mahomed Ali in 1815 at Byssel, consisting of 25,000 men, had only 500 horsemen with them, mostly belonging to Redjed and the followers of Faisal, one of Sauvris' sons, who was present in the army. The climate and pasture of Yemen is said to be prejudicial to the health of horses, many of them die there of disease; their breed never thrives, and it degenerates in the first generation. The Imam of Sauræ, and all the governors of Yemen, raise a yearly supply of horses from Nedjid, and those of the sea-coast receive considerable supplies by Sowakin from the Nile countries.

"During the Watabee government, horses yearly became scarcer among the Arabs. They are sold by their masters to foreign purchasers, who carry them to Yemen, Syria, and Bassora, which latter place supplies India with Arabian horses, because they are afraid to have them seized by Saoud or his successors, it being become the custom, upon every slight pretext of disobedience and unlawful conduct, to declare a Bedouin mare forfeited to the public treasury. The possession of her besides obliges her master to attend continually his chief in war. Many Arabs thus prefer keeping no horse at all. In the district of Djibel Shamar many encampments were seen of late without a single horse, and it was known that the Arabs Meteyr, between Mednich and Kasym, had reduced their horses within a few years from 2000 to 1200. The late sheriff of Mekka, kept an excellent stud of horses. The best stallions of Medjed were carried to Mekka for sale, and it was become a fashion among Bedouin women, going a pilgrimage to Mekka, to bring the sheriff the stal-

horns of their husbands as a present, for which they took in return presents of silk, ear-rings, &c.

"As far as my knowledge goes, Syria is the best place to purchase true Arabian blood horses, and no district is more convenient for that purpose than the Neuran, where the horse may be purchased from the first hand, and be chosen in the encampments themselves of the Arabs who fill these plains in spring time. The horses bought up at Bassora for the Indian market, are purchased second-handed from Bedouin dealers, and an Arab will seldom undertake to send a good horse far off to the market with the uncertainty of selling it. True blood horses of the Khomaze, as I am credibly informed, seldom find therefore their way to Bassora, and most of the horses purchased there for the Indian market are belonging to the Montefek Arabs, who are not careful in maintaining a pure breed. It might perhaps be worth while for the great European powers to keep persons on purpose constantly employed in Syria in purchasing horses for them, as the best means to cross and improve their own stud. Damascus would be the best position for such persons to reside in. I fancy that very few true Arabians of the best breeds, and still less any first-rate horses of them, have ever been imported into England, although many Syrian, Barbary, and Egyptian horses have gone by that name."

"The Bedouins say that the Egyptian mare, if coupled with a blood Arabian, produced a good breed, much better than the indigene Syrian mares, whose breed is not worth any thing even if crossed with the Kobeys. The Bedouins of Nedjau are in the habit of purchasing mares from the Egyptian pilgrim caravans, which they cover by good stallions, and which they sell afterwards the fillies to the Arabs of Yemen. In Egypt itself, on the borders of the Nile, no particular breed of horses is distinguished; the best horses in this country are produced in those parts where the best clover grows, which is in Upper Egypt about Tahsa, Armimia, and Tarrivoust, and in Lower Egypt, in the district of Meuzaleh. Extremely few blood horses come to Egypt, which is less to be wondered at, as this eminent quality of bearing fatigue is little wanted in the fertile Nile borders. The Egyptian horse is ugly, of coarse shape, and looking more like a coach horse than a racer; thin legs and knees, short and thick neck, are their greatest defects. The head is sometimes fine, but I never saw fine legs in an Egyptian horse. They are not able to bear any great fatigue, but when fed their action is much more brilliant than that of the Arabian; their impetuosity renders them peculiarly desirable for heavy

"I have never met with any geldings in the interior of the desert. It would be erroneous to suppose that the horses of the Rhouse or noble breed, are all of very perfect and distinguished quality and beauty. Amongst the descendants of Eclipse may be found mere hacks, and thus I have seen many Kobeys that have little more than this name to recommend them, although the strength of bearing fatigue seems to be common to all the desert race. The fine horses, however, of the Rhouse, are in far greater number than the common horses belonging to the same breed, but amongst these fine horses few only are found that may be called *first-rate horses*, in either bone, beauty, or action; among a whole tribe, five or six only, and in the Syrian desert there are perhaps not more than 200 of that description, each of which may be worth in the desert itself from L. 150 to L. 200; of these latter, very few if any have ever found their way to Europe, although it is through them alone that successful attempts could be made to enoble the European race, while the usually imported horses are all of a second or third quality."

cavalry, and it is upon this quality of the horse which the celebrity of Egyptian cavalry has ever been founded. In their first onset it is much superior to the Arabian, but where long marches become necessary, and the duties of light horse are required, the Egyptian yields infinitely to the Koheyl. The Lybian Bedouins draw their supply of horses from their own breeds as well as from Egypt. In the interior of the Desert and towards Barbary, they are said to have conserved the ancient races of Arabian horses, but this is not the case in the vicinity of Egypt, where they distinguish as little any peculiar races as the Egyptians do.""

"The Arabs of Naazy and Neteyn, Upper Egypt, in the desert between the Nile and the Red Sea, have continued the breed of the Rhouse among them. As in Arabia, horses are possessed by them in partnership; they divide each horse into twenty-four shares or kerats (according to the division of landed property in Egypt, which is always divided into kerats), and such a one buys three or four or eight kerats of the mare, and shares in proportion in the benefits arising from the sale of the young breed. So little is known in Egypt among the soldiers of the true breed, that when in 1812 Ibrahim Pasha's troops took ten Koheyl horses belonging to Neteyn, the soldiers sold them among themselves like common Egyptian horses, while their former owners valued them at least three times that price. For 100 Spanish dollars a good cavalry horse can at all times be got in Egypt; the highest price paid for an Egyptian horse is 300 dollars, a Bedouin would never give fifty dollars for the same. The Mamelukes formerly esteemed the Koheyl of the desert, and went to considerable expense in propagating their breed in Egypt. The present masters of this country have not the same passion for fine horses as their predecessors, who had in many respects adopted Arab notions, and had made it a fashion amongst them to acquire a complete knowledge of horses, and to keep their stable upon a most extravagant establishment.""

"The Bedouins use the horses of the Rhouse exclusively as stallions. The finest horse born of a mare belonging to a race which is not comprised within the Rhouse, would, notwithstanding its beauty and perhaps superior qualities, never be admitted as a breeder. Savud, the Wahabee's chief favourite mare, ‡ which he constantly rode on his expeditions, and whose name, Reraye, was become famous all over Arabia, brought a horse of very superior beauty and excellence; the mother, however, being not of the Rhouse, Savud would never permit his people to use that horse as a stallion, and not knowing what to do with it, as Bedouins, like the Lybians, never ride horses, he sent it as a present to the heriff. §

* "About the pedigree of Arabian horses, I must here add, that in the interior of the Desert the Bedouins never made use of any, as among themselves they as well know the genealogy of their horses as they do that of their masters; but if they carry their horses to market to any town, as Bassora, Bagdat, Aleppo, Damascus, Medina, Mekka, they then take care to have a pedigree written out, in order to present it to the buyer, and only in that case will a Bedouin be found possessed of his horse's pedigree; while on the other hand, in the interior itself, he would laugh at being asked for his mare's pedigree."

† "In Redjed, the Nadaba and Dahma are much esteemed. The breed of the Mesena of the Koheyl races, serves in Redjed never as a stallion."

‡ "Savud bought her from a Bedouin of the Arabs Kahtan for 1500 dollars."

§ "A troop of Druves on horseback attacked, in the summer of 1815, a party of Be-

"The Bedouins generally do not permit their mares to be covered until the completion of the fifth year; poor people who look anxiously forward to the profits to be derived from foaling, often have them covered after the completion of the fourth year. The price paid for the use of a stallion covering a mare, is one Spanish dollar. The master of the horse has a right to waive the payment of the dollar, and may take his chance to wait until the mare foals; if she throws a filly, he is entitled to a young female lamb of one year of age; if she brings a foal, he takes a similar male camel in payment of the use of his horse. When a horse is born, the Bedouins never let it drop down to the ground, but receive it upon their arms out of the womb of the mother, and keeping it for several hours upon their arms, occupied in washing it, in stretching and strengthening its limbs, and hugging it like a baby. After which they put it down and watch its feeble steps with particular attention, prognosticating from that movement the virtues or defects of their future companions. The people of Medjid feed their horses regularly on dates. At Deyrach, in the country of the Flasse, dates are mixed with the dried clover (*birseem*), and given them in food. Barley, however, is the most usual food in all parts of Arabia.

"The wealthy people of Medjid frequently give flesh to their horses, raw as well as boiled, together with all the offals of their table. I knew a man at Hamah, in Syria, who assured me that he had frequently given his horses washed meat before a fatiguing journey, to make them endure the journey with greater facility. The same person related to me, that being apprehensive of the governor of the town taking a liking to his favourite horse, he fed it for a fortnight exclusively upon roasted pork, which increased its mettle to such a height, that it became absolutely ungovernable, and could be no longer an object of desire to the governor. I have seen vicious horses in Egypt which were apt to bite, cured of this vice in presenting to them, while in the act of doing so, a leg of mutton just taken off the fire, the pains the horse felt in biting through the hot meat, made it give up that trick after a few repeated lessons. Egyptian horses are much less soft in their tempers than Arabian; * they are often vicious, while the latter almost never are, and require to be constantly tied, while the Arabians freely walk about the encampment like camels.

"Egyptian grooms are famous all over the East for the treatment of horses, so much so that the Pashas and grandees all over Asiatic Turkey make it a rule to have always a couple of them in their service. They curry a horse

douins in the Homrau, and pursued them to their encampment, when they were in their turn assisted by a superior force, and all killed, excepting one, who fled. He was pursued by one of the best mounted Bedouins, but his mare, although fatigued, kept up the run for several hours, and could not be overtaken. Before his pursuer gave up the chase, he cried out to him, promising him safe conduct, to beg to be permitted to kiss his excellent mare upon her front. Upon his refusing, he at last left the close pursuit, and in blessing the generous beast, cried out to the fugitive, "Go and wash the feet of your mare and drink off the water." This last expression is much used by the Bedouins to shew the great love they bear to their mares, and the obligation under which they are to them.

* "The Arabs have the Prophet's saying continually in their mouths, 'Good fortune rests upon our noble horses.'"

three or four times a-day, and make themselves so busy about it, that it is against law in Egypt to have as many grooms as horses in the stable, every one of the former having the care of one horse. The Wahabee chief, who has no doubt the finest stud of horses in the whole East, never allows his mares to be mounted until they have completed their fourth year.* The common Bedouins frequently ride their own before they have completed the third. The Wahabee chief has prohibited his Arabs the selling of one-third of a mare, as is frequently practised among the northern Arabs, alleging that the custom leads often to unlawful and cheating tricks. He permits the selling of one-half of the mare."

ON THE DEGENERACY OF THE CULTIVATED VARIETIES OF THE POTATO.

By Mr GORRIE, Annat Garden.

THAT plants continued in cultivation by grafts or cuttings partake of the youthful vigour, maturity, and aged debility of the parent plant, is a doctrine in vegetable physiology that has been advanced and supported by apparently sound philosophical reasoning. Into that question, on which much has been written on both sides, it were occupying too much room at present to enter. The following facts, however, regarding the history of a widely cultivated variety, may appear to confirm the doctrine of a sympathetic state of health or decay experienced by the individual raised by cuttings, affected by the period it may have been in cultivation from the original seedling or type of the variety; that is to say, these facts may countenance the opinion, that plants extended by cuttings, and not by seed, have a period of vigorous youth, of maturity, of old age, and ultimately of leath. The potato, it may be observed, is preserved, and the individual variety cultivated from time to time, not by seed but by tubers, analogous to the extension of choice seedling trees by grafts or cuttings, neither being renovated by seed without acquiring qualities and habits different from those of the parent plant. That old age may have overtaken many of the varieties of potato long since cultivated in this country, and long since lost, is proved by such varieties having long disappeared. At the commencement of the present century, a flat white

* The tail is never left to grow at full length until the horse or mare has completed her fourth year. The back teeth are counted with the mare up to the fifteenth year."

potato was in general field culture; and possessing qualities not equalled by its successor in this county, the "Perthshire red." This flat white potato, in the last years of its culture, became sickly, and on early soils very liable to curl. In the year 1806, I received a few of the variety, since known by the name of Perthshire Reds, from the late Dr Coventry, who, I was told, had the tubers from Ireland. They were recommended as being tolerably mealy, very prolific, and not liable to curl. In 1807-8, I introduced them to the "braes" of the Carse of Gowrie, where they yielded an extraordinary return; and although, on analyzing, they did not contain quite so much nutritive matter per bushel as the then ordinary variety, yet, from their vigorous healthy growth and prolific nature, they soon spread over the county, and the white flat variety disappeared. For ten years I cultivated the new variety in an early and dry soil, where potatoes are generally liable to curl, without perceiving the slightest tendency to that or any other disease, although I never changed tubers for planting. From the tenth to the fifteenth year of their culture here, they began to shew symptoms of curl; and the seed-plums which, on their first introduction, were exceedingly numerous, began to be very scanty. To communicate fresh vigour, it was found necessary to change seed tubers from late and high to low and early soils. This for some time, say two seasons, generally prevented the appearance of curl, but, if continued longer, the whole field was infected; nor, even in the first year of the change, was there any thing like the usual crop of seed-plums observable. Ultimately, a taint or rot in the seed-tuber appeared in this and other long-cultivated varieties, and every method of pampering their decayed constitution was and is resorted to. Heating in pits is recommended to be avoided; but in days of yore, heating in deep masses in close houses did not affect their health. Early planting has been recommended, and yet the occupiers of early soils must go to late situations for seed tubers. Planting, without allowing the seed tubers to come in contact with unfermented dung, has been resorted to; but erewhile this was reckoned wholesome practice. Planting when the soil is moderately moist is tried, but new and vigorous varieties succeed though planted when the soil is dry, whether newly cut or cut a month

planting, whether the dung be fresh or fermented, whether the tuber has been moderately or well ripened, or whether they may have been preserved in pits in the ordinary way or preserved with greater care. In fine, to use the language of Mr Simpson, "*Killeen*," Ireland (see Newry Telegraph, Dec. 29), "As to the potato *degenerating*, there can be no doubt of it; but, by good cultivation, there can be much done to prevent it;" and much pampering will be necessary, and much disappointment will be felt, till once new and vigorous varieties, possessing excellence in quality and produce, be obtained. To acquire this, *crossing* between healthy and vigorous parents should be tried. To communicate vigour to the plant, and induce seed-bearing, the tubers should be pinched off from the roots as they begin to form. The seed plums, when ripe, should be slit across, and the pulp squeezed out in a basin of water, washed, strained, and the seed dried, and retained for sowing next spring. The produce of every *individual stem* should be kept *distinctly separate*. Some may even shew symptoms of disease or debility the first or second year, and all such should be rejected. Varieties possessing green broad healthy foliage, vigorous stems, and displaying native vigour, by a tendency to seed-bearing, should be tested the second year as to their fertility, quality, form, &c.; and the third year, select varieties should be tried on different soils, to prove their adaptation to general culture. In the mean time, every precaution should be adopted to obtain returns from the varieties new in the "sear and yellow leaf," till, by perseverance, new and improved varieties are obtained to ensure success in the cultivation of this now necessary article of subsistence.

MISCELLANEOUS NOTICES.

I. *On a particular Mode of applying Farm-yard Manure.* By Mr John Baker, Nassau Cottage, Leeds.—The present depressed state of agriculture through the kingdom, invites the serious attention of all connected with that important branch of industry; it being a lamentable fact that, whilst the most splendid discoveries in science are daily applied to the improvement of our trade and commerce, agriculture, as a science, remains almost stationary, notwithstanding individual and national prosperity are so deeply interested in promoting its welfare. For more than twenty-five years I farmed from 500 to 1000

acres in the county of Norfolk, during which time my attention was carefully directed to the consideration of every method or system of farming which was calculated to increase the productiveness of the soil, and to improve the condition of that numerous and industrious class of persons who are dependent upon it. The proper use of manure is amongst the most material improvements which I have discovered. By the common, I may say general, mode of managing it, only half the benefit which ought to be conferred on the crops is given, whilst the system which I have adopted doubles the value of all the manure made, and at the same time it really lessens the expense; and it is to this point that I will confine myself in this paper. That "the muck-cart is the best farmer," is a maxim as fully acknowledged as it is oft-repeated, and believing that upon the proper use and application of it the success of the farmer mainly depends, I have never failed to attend to this important branch of husbandry. Having experienced the practical advantages of my system, as well upon land under my own cultivation in Norfolk, as upon farms belonging to my relations and friends in that county, where it had been introduced at my suggestion, I am induced, at the earnest recommendation of many gentlemen who have also witnessed its beneficial effects in Yorkshire, to invite the attention of agriculturists generally to the subject. Manure of almost every description is carried from the place where it is made, and deposited on a heap for four, six, or eight months, where it ferments and becomes a soft, black, cohesive mass; it is then put on the land and ploughed down, after which the crop is sown; this may not always be done, but something resembling it is the prevailing and general practice in every part of the country. My method, the success of which has been proved by numerous experiments, is to spread the dung on the land as soon as convenient after it is made, except in winter; the manure made at that period of the year remains in the fold-yard till the spring, where it does not ferment. The whole is taken in the spring, summer, and autumn, fresh to the land; if in fallow it is ploughed in with a thin furrow; the land is harrowed and ploughed again in a fortnight, and in a fortnight after harrowed and ploughed a third time; after which the muck, however long it may have been, is reduced, and the soil will be in as fine and friable a state as the land is capable of. From the time the dung is put on to the last mentioned ploughing, nothing can be more unsightly than its appearance. If it is to be applied to pasture, I spread it over the surface of the ground from the beginning of spring to the end of autumn. Three essential points are to be observed: First, to apply the manure to the soil as soon as convenient after it is made (except in the depth of winter); secondly, to keep it as near the surface as possible; and, thirdly, to mix it well with the soil. These being observed, I confidently assert, that advantages equal to double those now derived from manure are communicated to the land by an increase in the fertility of the soil, exhibited in healthier and more abundant crops; so that a farm of 200 acres of arable land of medium quality, producing 400 loads of dung or two load for every acre, worth five shillings per load, will be benefited to the extent of ten shillings per acre annually, and where more manure is made, which on every well man farm is done, the advantages will be greater. This result has been upon the farm now in my occupation, belonging to Lord Cowper,

neighbourhood of Leeds, to which I entered at Candlemas 1831; it was then in the most deplorable condition; so deplorable was it, indeed, as to lead many of my friends and neighbours to predict the impossibility of my procuring a tolerable crop upon one of the fields for seven years to come; but this field, from the application of manure according to my method, has become exceedingly productive. I fallowed it for turnips, and in May (1831), I put on about twelve and a half tons of good fresh-made stable-dung per acre; as much as possible was taken from the stables and carried to the land the day it was made. My proceedings greatly amused my agricultural neighbours. The preceding tenant observed, that however such a system might have answered in other parts of the country, here it would be a useless expenditure both of time and money, and a great waste of manure. To convince him of the benefit to be derived from such manuring, I directed one piece in the middle of the field to be left without covering. With the exception of the land upon which no manure had been laid, the field produced a very fine crop of turnips, worth at least six pounds per acre, whilst the crop raised upon the land not manured was not worth six shillings per acre. After the turnips the field produced a very heavy crop of barley, averaging not less than seven quarters per acre, and in 1833 I obtained a most abundant crop of clover without any manure except on the land omitted in the first year. I also covered a field of pasture the same summer with the same kind of manure, half of it in June and the rest in August. Six weeks after the first part was done I showed it to a very shrewd and scientific gentleman, well acquainted with country affairs, who expressed his astonishment at the improvement. In October, the farmer whose land adjoins my own, said he had never before seen such extraordinary improvement in any ground. Knowing that he was one of those who had ridiculed my system, I hinted to him that the propriety of it had been much doubted. He acknowledged he had condemned it, and said he now saw that which he would not have believed had he not witnessed it, and that he thought the manure must have contained a large portion of white clover and other grass seeds, otherwise, in his opinion, such an effect could not have been produced. In the hottest part of last summer, I covered, in the same manner, the only field on my farm which had not been previously dressed in a similar way, leaving two ridges in the middle unmanured. I removed all the cattle from this field for six weeks, at the end of which the two ridges had scarcely grass to sustain a goose, whilst the rest of the field looked like a field of fog or aftermath. Many gentlemen examined it. Some seemed satisfied that much benefit was derived at very little cost; others expressed their conviction that it was the greatest improvement they had ever seen, and it is my firm belief that, from the time the dung was put on to the end of summer, I had at least three times as much grass from the land manured as from the other. I must mention another fact. The man who spread the dung had farmed many years for himself, and might be considered a clever man; he said to me, you would not thus waste manure, if you had not the means of getting plenty more. I asked him to wait a month before he decided; he then declared that he had never been so much mistaken. I mention these things, knowing that my plan has much to contend with, and hoping that noblemen and gentlemen, who try my method, may

not be laughed out of it before they have applied to it the test of due experience. It may be said that, in these experiments, I did not compare different sorts of manure. I have done so repeatedly, but, in truth, I had then no rotten dung by me. I would propose, to any one who doubts the propriety of my plan, to put a given weight of fresh dung on a heap, to remain (turning it over or not) for twelve months, at which time spread it over the land, and at the same time take a similar weight of fresh dung of the same kind, and spread it over double the space, and I doubt not the result. Hitherto I have confined the recommendation of my plan to practical experience alone, but I am not without scientific and chemical authorities to support me. Mr Joseph Hayward's *Treatise on the Science of Agriculture* is worth reading by the agriculturist who searches after truth. Being aware of the great difficulties with which the farmer has to contend, I should recommend any new system with great diffidence, if attended with additional expense; but as the plan I am desirous to introduce is alike recommended by its simplicity and economy, and also eminently calculated to promote the fertility of the soil, and to secure, by that means, a more adequate remuneration to the farmer, I cannot doubt of its being generally adopted, whenever its practical advantages are more generally known and appreciated. With a view to facilitate its introduction, it will give me great pleasure to correspond with, or to wait upon, any nobleman or gentleman, and to explain more fully the details of my method of applying manure, or to assist in introducing the practice upon any farm in hand, either under my own superintendence, or that of my son, who is at this time disengaged, and who is abundantly qualified for such purpose, he having for several years having had almost the entire management of a farm of 800 acres in the county of Norfolk, belonging to myself, upon which, as I have before observed, the system was proved to be highly beneficial. My subject has drawn me on to greater length than I expected; I cannot, however, conclude without saying, that if, by the system I recommend, 10s. or 15s. worth of manure can be added annually to every acre of land of moderate quality, at no greater expense than by the old method, I think the landlord, the tenant, and the public, will be great gainers.

II. *Canada Wheat.*—*Woodhill, East Flambro', January 20. 1836.* SIR,—I should feel gratified if you can afford room in your columns for a few remarks upon a subject in some degree personal, yet not altogether devoid of general interest to recent settlers in this province. In some notes upon emigration to Canada, published in 1834, I took occasion to state the *practicability* of an industrious emigrant obtaining land and reaping a crop *within a year from entry*. I further stated that he might, with some confidence, reckon upon a return, in good soil, of twenty-five bushels per acre. This statement, I may observe, was never assumed as what *would* generally be done, but merely as what *might* be effected without any very extraordinary effort or expense. It has been virulently attacked and treated as utterly chimerical by Mr Shirreff and others. Conscious that I intended no deception, but dubious in some measure of results, I abstained from noticing these cavillers until I could offer some decisive proof. Mr William Buist, an old and respectable farmer, from the fine district of Strathmore, in Scotland, who purchased from me above 300 acres, in Nichol, has communicated to me an account of his first crop, which I now

beg leave to annex. I may just add, that Mr B. is possessed of respectable, though not superfluous funds, and that he has no family to assist him in clearing his lands. The whole was done by contract, and under many disadvantages. Mr B. is well known in his own circle of friends as a man distinguished for the strictest accuracy in all his averments; and the trifling excess, viz. from 15th July to 20th August, in such a season as last, cannot reasonably invalidate the statement to any candid and impartial mind. A. FERGUSSON.
 —*Copy of a Letter from Mr Buist to Mr Fergusson, January 13. 1836.* SIR,
 —As it may be gratifying to you to hear the result from my first crop of wheat sown in the Fergus settlement, I herewith send you a short statement with regard to it. On the 15th July 1834, I commenced clearing my land, sowed my wheat on the 20th of September, and began my harvest on the 30th of August 1835. The field was accurately measured after the crop was cut, and notwithstanding the very unfavourable weather during harvest, which I have no hesitation in saying lost me at least one and a-half bushels per acre, I find the return to be rather more than *twenty-six and a-half bushels per acre.* I am, Sir, yours, &c. (Signed) WILLIAM BUIST.—*Dundas Weekly Post, Upper Canada.*

III. *Mode of supporting the Poor in Belgium.*—Viscount Vilain XIII, who has been long appointed Minister at Rome, has resigned his office as Governor of East Flanders. Before quitting Ghent, Viscount Vilain addressed a circular to the different functionaries under his government, in which are some interesting details relating to the operations of the charitable workshops (*ateliers de charité*), established in different parts of Flanders. He states that the number of these institutions amounts to forty-three; that the total prime cost of material and salary paid to the poor amounts to 176,378 francs, and the same of manufactured articles to 162,583 francs, leaving a loss upon the whole of only 13,804 francs. Thus, at the expense of 13,804 francs, provision and employment have been given to 2265 poor people during the whole of the winter and part of the spring; and thus, at the trifling expense of six francs per person, forty-three parishes have been rescued from the evils of mendicancy, and a large body of poor creatures, who must otherwise have begged or starved, have been actively and usefully employed, and have had the means of supporting their families without other parochial relief. The letter adds, that the average loss of six francs only arises from defective administration in some of the parishes, since it results that, in twenty-five out of forty-three, the loss has not exceeded two francs, and indeed in some of these has not been more than eighty centimes per person. In seven parishes the receipts nearly balance the expense, so that the poor have cost little or nothing; and in four parishes the returns have exceeded the expense, so as to leave a balance in the hands of the directors after supporting all the poor. These are remarkable results, and are well worthy the attention of the philanthropists in England and Ireland; for what can be more praiseworthy, more advantageous or honourable to the community, than the establishment of institutions by which pauperism, idleness, and immorality are neutralised without expense, and by which a number of persons who would be otherwise thrown upon the public workhouse, or become burdens to the parish, are actively employed, and encouraged in habits of industry and economy? Viscount Vilain earnestly recommends the establishment of similar workshops throughout the whole

country. Were he able to effect his benevolent object, he would obtain one of the most important and most beneficial results ever effected in a civilized nation; and Belgium would present the phenomenon of a whole population purged, as it were, of idleness and pauperism. Whilst upon the subject, it may be observed, according to official statistical documents, published by order of the minister of the interior, that the total gross amount of the revenue of hospitals, charitable establishments, and of the divers sums expended upon the poor, amounted, in 1833, to 11,647,000 francs, or about 285 francs per individual. The number of the poor in the provincial workhouses has been reduced from 3454 in 1827, to 2662 in 1833, a remarkable diminution, seeing that the population has increased in an inverse ratio, having augmented from 3,800,000 in 1827, to 4,061,000 in 1833. The same document states, that the total number of persons receiving instruction at the various colleges, schools, and places of education of all denominations, amounted altogether to 353,342 in 1826, whereas in 1833 the number of children attending the 5229 primary schools alone exceeded 370,000. If the progress of education had been great, the diminution of immorality is not less striking, for one finds the number of foundlings (*enfants trouvés*) to have amounted to 11,023 in 1823, whilst in 1833 they did not exceed 7997. This is not a place to develop subjects of this kind, but the above examples will suffice to shew, that Belgium is making considerable progress in those branches of administration and general morality which are the most essential to the well-being of a nation. It must not be omitted to state, that the tables in question give the population to the 1st of January 1835 at 4,165,953 souls; the superficies of the soil at 3,420,570 hectares (each $2\frac{1}{2}$ acres), of which 381,470 hectares, or about one-tenth, are uncultivated, not including more than 100,000 hectares or $1\text{--}34\text{th}$ of roads and canals. In France, the uncultivated land, out of a superficies of 52,570,000 hectares, amounts to 9,000,000, or one-sixth; and the roads, canals, streets, &c. to 1,216,746, or one-fifth; both of which shew a remarkable balance in favour of Belgium.

IV. *Progress of Digestion*.—Alexis St Martin, a Canadian, eighteen years of age, having a good constitution and robust health, was accidentally wounded by the discharge of a musket in June 1822. "The charge, consisting of powder and duck shot, was received in the left side, at the distance of one yard from the muzzle of the gun. The contents entered posteriorly, and in an oblique direction, forward and inward, literally blowing off integuments and muscle to the size of a man's hand; fracturing and carrying away the anterior half of the sixth rib, fracturing the fifth, lacerating the lower portion of the lungs, the diaphragm, and perforating the stomach." Thanks to an extraordinary constitution, and the skill and attention of Dr Beaumont; this young man recovered. The wound in the stomach had sloughed, lacerated portions of the stomach had come away, the edge of the orifice had healed, but the opening had never closed. A year after the accident, the injured parts were all sound, a perforation into the stomach remaining open of two and a half in circumference. The food could only be retained in the stomach by means of a compress over the aperture, secured by a bandage, till some months after this time, when a fold or doubling of the inner coat of the stomach appeared, and gradually increased in size, till it filled the aperture, and

acted as a valve, preventing completely the escape of any of the contents of the stomach through the aperture, but being easily pushed back from without, so as to admit of any thing being put into the stomach or taken out of it. The man was now in perfect health, the facility of observation had never been equalled, and Dr Beaumont availed himself in the most masterly manner of the opportunity thus offered. "Dr Beaumont begun his experiments in May 1825, and continued them for four or five months, St Martin being then in high health. In the autumn St Martin returned to Canada, married, had a family, worked hard, engaged as a voyageur with the Hudson's Bay Fur Company, remained there four years, and was then engaged at a great expense by Dr Beaumont to come and reside with him on the Mississippi, for the purpose of enabling him to complete his investigations. He came accordingly in August 1829, and remained till March 1831. He then went a second time to Canada, but returned to Dr Beaumont in November 1832, when the experiments were once more resumed, and continued till March 1833, at which time he finally left Dr Beaumont. He now enjoyed perfect health, but the orifice made by the wound remained in the same state as in 1824." Dr Beaumont has determined several very interesting matters, which have been long subjects of controversy among physiologists, and with which it is important that all men should be acquainted. It used to be thought that the gastric juice is poured out during the intervals of digestion, accumulating to be in readiness for the next meal. The Doctor has proved that this is not the case. St Martin fasted for some hours, and was then placed so that the opening into the stomach was exposed to a strong light. Dr Beaumont had then a distinct view of the cavity of the stomach; and he found its only contents to be a little viscid mucus, mixed with saliva, being only occasionally, and then very lightly acidulated. There was in no instance any accumulation of the proper gastric juice. The reasonable deduction from this very important fact is, that, to eat little and often, with the view of defending the stomach from the action of the gastric juice, is unnecessary, seeing that no gastric juice is secreted when the stomach is empty. This was a prevailing error with the bygone generation of medical men, and is still a very general error among the non-medical public. It is thought that in delicate people it must be injurious ever to allow the stomach to get empty; and accordingly this much abused organ is kept constantly at work, to the manifest injury of its powers, with the view of protecting it from what, in fact, is not secreted, unless when required for the digestion of food.—*Magazine of Health*.

V. *Stephens's Writing Fluid*.—Dr Birkbeck, the President of the *Mechanics' Institution*, gave a lecture upon the relative excellence of *Writing Fluids and Inks*. After some general observations on the importance of the art of writing to man, in its handing down to posterity all that was worth preserving of by-gone ages, its power of assimilating mind to mind, and, as Pope beautifully says—

"Spreads the soft intercourse from soul to soul,
And wafts a sigh from Indus to the Pole,"—

the lecturer proceeded to make some remarks on the various substances used in different ages of the world for writing on, from the papyrus of the Egyptians to the beautiful sheet of linen paper, now capable by the power of ma-

of being made to an almost infinite size. The multiplication of the instruments for impressing the paper with our thoughts was also astonishing; no less than two hundred and forty millions of metal pens being now to our stock of quills, which latter did not seem to diminish—a proof of progress of education and civilization. The practice of the Egyptians to paint rather than write their characters. Pliny and Vitruvius make mention of the Roman ink, and Dioscorides says, that it was made of one part of lamp-black powder, probably lamp-black, and three parts of gum. This formed the ink with which the Romans wrote, or rather painted their characters. This ink then employed was more durable than the writing-ink now used, as papyrus and manuscripts found in Herculaneum fully proved, and which had been buried 2000 years ago. The Chinese of the present day paint and write their characters, making use of a small brush and Indian ink. The Indian ink of our ancestors was superior even to our own ink; for we have manuscripts written in the fifth and sixth centuries, which are in a degree of preservation than those written in the fifteenth and sixteenth centuries. The materials for making ordinary ink are galls, iron, gum-arabic, and water. Galls are a growth or excrescence formed on the footstalk of the oak, by an insect, which, boring and depositing with its ovipositor, occasions the growth of the excrescence by the wound it inflicts, and the excrescence is the shield of the egg until the mature insect bores a passage and escapes. These galls contain a peculiar acid, called gallic acid, and when united with the sulphate of iron, forms the black fluid called ink. Verdigris and sulphate of copper, or blue vitriol, are also employed to deepen the colour; but the copper has great disadvantages, because when the pen is used, if it is not perfectly clean, a deposit of copper is formed on the pen which greatly deteriorates its sharpness: this kind of ink also encrusts the penstands, and clogs the pen so as to prevent the free flowing of it to the nib and it is also easily erased from paper by acids and other chemical agents. It became, therefore, a great object to obtain a fluid for writing, which should not be subject to these disadvantages and inconveniences; and Mr Henry Stephens, chemist, London, did appear to be free from those inconveniences. Mr Stephens not having sought the protection of a patent, had given rise to a number of imitations—many of which were probably very good, but certainly, in his opinion, not equal to that produced by the original inventor. He, the lecturer, had seen journals as day-books and ledgers, by which it appeared the inventor has used this composition for four years. The struggles of the inventor might be seen in his attempts with various colours. Upon this composition alone he had made 250 experiments. In the two saucers before them, were two modifications of the ink matter used in the composition of this fluid, one of which is perfectly dry and the other always wet, from its disposition to deliquesce, or absorb moisture; and upon this disposition its fluidity in a great measure depended. The permanency of colours may, in a great degree, be tested by an agent which acts in the same manner as the sun and time, namely, the chlorine, which produces the same effect in a short space as would require a long exposure to effect. He had taken ten specimens of writing fluid,

had submitted them to the action of chloride of lime. The first line was written with Stephens's, and all the intermediate lines with various imitations; the last line was also written with Stephens's, mixed with one-half water; as they would perceive, the first and the last lines were the only ones remaining. The lecturer then repeated the experiment with Stephens's fluid and several other imitations, by causing a line to be written with each (*each bottle being previously well shaken*); on the application of the chloride the imitations disappeared, while the original remained little, if at all, affected. Slips of paper were exhibited by the lecturer, half of which had been soaked with the fluid more than twelve months since, by which it appeared that the part soaked was as sound and good as that which had not been. An inkstand was also exhibited, the invention of Mr Stephens, which appeared well adapted for using the fluid. He thought Mr Stephens entitled to much credit for his invention; and as this article might be purchased at about the same price as the best common inks were formerly sold, he had no doubt but he would obtain, as he deserved, the patronage of the public. He (Dr Birkbeck) could bear testimony to the strength of the article, having used it diluted with water. He then glanced slightly at the sympathetic inks, which he termed rather amusing than useful, and the marking inks for writing on linen—of the latter of which he spoke in terms of unqualified praise—and said that however unimportant this subject might appear, yet that it was of the very first importance could not be denied, as an adjunct of that art which had brought civilization, the sciences, and all the arts of life, as they now exist.

VI. *Grants of Public Money to Scotland and Ireland in ten years from 1823 to 1833 :—*

IRELAND.

POOR.

For the employment of the poor,	L.140,000*
For such measures as the exigencies of distress in 1833 may require	200,000
Commissioners of Charitable Donations	6,422
	<hr/> L.346,422

ACADEMIES, HOSPITALS, &c.

Royal Irish Academy	L.3,000
—Cork Institution	14,263
—Dublin Society	68,500†
Belfast Academical Institution	6,000
Richmond Lunatic Asylum, Dublin	65,978
Female Orphan House do.	17,335
Westmoreland Lock-Hospital, do.	30,961
Lying-in Hospital do.	26,407
Dr Stevens's Hospital do.	15,856
Fever Hospital do.	37,668
Hospital for Incurables do.	4,140
	<hr/>
Carried forward	L 290,108 L.346,422

* Of which L.100,000 in 1823, and L.40,000 in 1832.

† Commenced in 1829.

MISCELLANEOUS NOTICES.

593

	Brought forward	L.290,108	L.346,422
King Hospital	do.	307,525	
Marine Society	do.	16,118	
— Society for Soldiers' Children	. . . . .	74,115	
of Industry	. . . . .	207,872	
ing Society	. . . . .	12,500	
			908,238

EDUCATION.

tant Charter Schools	. . . . .	L.154,941	
y for Education of the Poor	. . . . .	198,000	
Lieutenant, in aid of Schools erected by Vo-			
ntary Contribution	. . . . .	66,000	
			413,941

PUBLIC WORKS, &c.

hadec Harbour	. . . . .	L.119,577	
1 do.	. . . . .	37,898	
ore do.	. . . . .	8,000	
ary and Kingston	. . . . .	291,000	
of Works	. . . . .	170,137	
land Navigation	. . . . .	48,395	
n Public Works	. . . . .	149,300	
			804,307

POLICE AND CRIMINAL BUSINESS.

1 Police	. . . . .	L.249,753	
hing Proclamations	. . . . .	58,300	
ial Prosecutions	. . . . .	398,289	
			706,342
			L.3,179,240

f Judicial Establishment for one year, 1830, including Salaries of Judges,
om the Chancellor down, Inspector of Prisons, &c. L.157,648 3 3½
ue of Ireland, one year, 1828 4,685,642 16 4

Rate of Collection L.13 : 16 : 3 per cent.

ich revenue, Assessed Taxes Nil

SCOTLAND.

ie Poor	. . . . .	Nil.
cademies, Hospitals, &c.	. . . . .	Nil.
ducation	. . . . .	Nil.

PUBLIC WORKS.

ge of Edinburgh	. . . . .	L.50,000	
onian Canal	. . . . .	100,090*	
Patrick Harbour	. . . . .	106,912†	
and Criminal business	. . . . .	Nil	
			L.256,922

* This for general good, in saving the passage by the Pentland Frith.

† This ought, in fairness, to be charged to Ireland.

Cost of Judicial Establishment for one year, 1830, including Salaries to Judges, Clerks of Session, Deputies, Sheriffs of Counties, Sheriff's Surpluses, Circuit Expenses, &c.		L.150,251 2 1 $\frac{1}{2}$
Revenue for one year, 1828		L.4,627,340 18 6
Rate of Collection L.6 : 7 : 3 per cent.		
Of which revenue, Assessed Taxes		L.294,914 18 4

STATE OF GRANTS.

Ireland, in ten years	L.3,179,240 0 0
Scotland do.	256,712 0 0
	<hr/> L.2,922,328 0 0

VI. *A Machine on a new principle, for raising Water, Coals, &c.*—The construction of this power is very simple, and its steady operation is quite assured. Its chief agent is a pair of wheels; or, if necessary, a series, moving with their diameters in the direction of the weight to be raised,—say the shaft of a mine. Taking the one pair of wheels, moving on the same axis, we find that, from the end of a radius or arm in each, a chain descends, so as to hang on opposite sides of a square passage. To each chain are suspended, at different but regulated distances, quadrangular frames, to the upper sides of which strong projecting iron rims, moving on the principle of the hinge, are attached. The boxes, or receptacles for the weight to be raised, have corresponding edges on each side. When the wheel above is turned, and a single box below is placed in connexion with the lowest frame, it is caught by its rim, and, with one revolution of the wheel, is sent up as high as the frame on the opposite side to that on which it is borne; here it is again caught and sent up to the apparatus on the opposite side again, and so on, by alternate transmission, it is brought to the top of the shaft. The machine being kept constantly laden below, and its wheel constantly turned above, it follows, that, at each revolution of the wheel, a box is delivered; and thus, in an exceedingly short space of time, a vast body of matter can be carried up through any depth of shaft. The raising of water is performed by means of the same machinery, only buckets with valves in the bottom are used instead of boxes. The machine could be most humanely employed, in large mines, in quickly sending the workmen up or down, to save them from their present tedious and tiresome expedients for that purpose.—*Mining Journal*.

VII. *Shoes impervious to Water.*—The following description of a patent lately taken out in the United States, is from the *Franklin Journal*.—"The soles may be made of plaited flax, hemp, or the inner bark of the linden tree. For the upper part any kind of cloth may be used, and the shoes lined with linen or cotton. The soles are then varnished or covered with the following composition:—One quart of flax-seed oil, two ounces of rosin, half an ounce of white vitriol, which must be boiled together for half an hour. After which take four ounces of spirits of turpentine, and two ounces of white oak saw-dust, which has been exposed twenty-four hours to the sun; mix these ingredients well together, and put them on the soles of the shoes with a brush

or in any other way, which, when dried, will render them impervious to water."

VIII. *Dove-tailing Wood*.—A fact, interesting to the antiquary, has been elicited on taking out the wooden keys which closed a fissure in the base of the obelisk, to replace them with two other keys of copper. They are completely corroded by the action of the air and moisture, and there is every reason to believe that they were inserted when the obelisk was first put up at Thebes, and shows that, 4000 years ago, the Egyptians were acquainted with the powerful means of uniting two pieces of wood now used, and called dove-tailing.—*Galignani*.

IX. *Etymology of Antimony*.—The monk Valentine, who wrote the *Currus Triumphalis Antimonii*, is supposed to have invented the name, and there is a tradition that he came by it out of the failure of an inductive experimental process, as follows:—He had given some antimony to the pigs who acted as food for the monks of the convent; the pigs ate it, as pigs will, and became fat in consequence, having previously been lean. Upon the result of the experiment, Valentine, reasoning like a Bacon, bethought himself that what was so good for a pig might not be very bad for a monk, and accordingly treated his brethren, who were worn with fasting, to an antimonial dinner. Never was the distinction between a pig and a monk so clearly shewn before. The monks all died, and left themselves no memorial except the pig meat, which they did not live to consume, and the name (*anti-moine*) which Valentine gave the metal.—*Book of Table Talk*.

X. *Succory Coffee*.—Succory root, cut, root, dried, torrefied, and ground to powder, is most extensively employed as a substitute for coffee, or rather, I ought to say, to adulterate coffee. A full account of the preparation of it will be found in the *Annales des Chimie*, lix. p. 307. Its consumption is so great, that some fear has been expressed of its seriously injuring the trade in, and cultivation of, coffee; and the Chancellor of the Exchequer has prepared to lay a tax on it. I am told that it is employed very largely by grocers to adulterate their coffee, by coffee-house keepers, and by economical house-keepers. It yields a perfectly wholesome and agreeable beverage, but wants that fine aromatic flavour peculiar to coffee, and for which the latter is celebrated.—*Mr Pereira's Lectures in the Medical Gazette*.

XI. *A new Method of Playing the Violin*.—A Monsieur Isoard has constructed a violin to be played by a pair of bellows. The performer holds the instrument after the manner of the violincello; his feet work the bellows, and his right hand directs the stream of air to the string requiring it.—*Musical World*.

XII. *Wear of Carriage Wheels*.—It has been calculated, by an engineer of eminence, that every four-horse coach deposits 12 lb. of iron in every 100 miles of its journey, and that consequently, assuming the number of such coaches passing daily between London and Birmingham alone to be 20, the weight of iron deposited during every transit exceeds 240 lb. These results, it is stated, are not conjectural, but derived from investigations applied to the horse-shoe and the tire of the wheel—in the first instance, previously to, and, in the second, after the wear and tear of the road had rendered them less; and they have been found, it is added, as to every ton weight of iron tried, nearly uniform.

XIII. Ancient Agricultural Societies.—After the Britons retired into Wales, it was enacted that no man should guide a plough who could not make one; and that the driver should make the ropes of twisted willows, with which it was drawn. It was usual for six or eight persons to form themselves into a society for fitting out one of these ploughs, providing it with oxen and every thing necessary for ploughing; and many curious laws were made for the regulation of such societies. If any person laid dung on a field, with the consent of the proprietor, he was by law allowed the use of that land for one year. If the dung was carried out in a cart in great abundance, he was to have the use of the land for three years. Whoever cut down a wood, and converted the ground into arable, with the consent of the owner, was to have the use of it for five years. If any one folded his cattle, for one year, upon a piece of ground belonging to another, with the owner's consent, he was allowed the use of the ground for four years. Thus, though the Britons had, in a great measure, lost the knowledge of agriculture, they appear to have been very assiduous in giving encouragement to such as would attempt its revival.

XIV. Busts and Portraits.—A new instrument has been invented in Paris, called the Physiognotype, for the moulding of busts, on a principle which renders the likeness to the original a mechanical certainty. Busts in plaster are thus produced for five francs each. Another machine, entitled the Portrait-mirror, has also been constructed, by which a portrait may be taken in twenty minutes, from the reflection of the face of the original in a looking-glass—*Athenæum*.

XV. Burying in Cross Roads.—The *British Magazine* gives the following explanation of the origin of this custom:—"It was usual to erect crosses at the junction of four cross-roads, as a place *self-consecrated*, according to the piety of the age; and it was not without a notion of indignity, but in a spirit of charity, that those excluded from holy rites were buried at the crossing roads, as places *next in sanctity* to consecrated ground."

QUARTERLY AGRICULTURAL REPORT.

THE past winter quarter has exhibited its hyemal characteristics more strongly than we have observed for some years. Frosts and snows have succeeded each other in rapid order, and yet, intense and great as both have been, they were but partially distributed. Whilst Scotland, it may be, was bound up with thick ribbed ice, Ireland was deluged with rain, and England covered with snow. There has been little snow in Scotland, especially in the lowlands. In the north of Ireland was no snow; and in the south of England it fell to a depth inexperienced for many years. The roads were blocked up, coaches stopped, mails due; and travelling for a time was suspended. Similar remarkable anomalies occurred on the Continent, Constantinople and Lisbon were whitened with snow. Do these anomalies portend any remarkable change in the affairs of the world? If we want an explanation, we need not, like the astrolo-

gers of old, gaze at the stars, whilst surrounded with meteoric agents, to discover the effects of physical influence on the constitution of man. These meteoric agents, by concurrent action, produce effects which terrify mankind. Is not the cholera a demon of their invocation? Well, then, the present epidemic, it cannot be denied, has pressed hard upon their footsteps.

With regard to the crop, we believe, the estimate which was formed of it on the foot was not far from the truth, but the estimate has been rather above than below realization. It varies much according to locality, and, as we said before, no season will prove so well as this the intrinsic value of good land. In fine districts the yield is commensurate with the bulk, but the latter is not great. In poor districts the gift is below expectation, for the bulk is superior to it. In the highest districts the crop will be quite unfit for seed. In all districts the quality is very inferior. From these circumstances, the prices of corn cannot be expected to fall. On the contrary, oats are expected to be very high at seed time, as the whole upper parts of the country will have to be supplied with seed from the lowlands. The recent high price of wheat has been occasioned by the sale of old wheat, of which considerable parcels are in the country, the new being very properly reserved until it attains a marketable condition in spring. Those who have kept their wheat of last and former years may now rejoice, the price since then being about doubled.

Such of the new wheat that we have seen looks pretty well. We presume the state of the last crop and the prevailing high price will induce a large breadth of wheat to be sown this season. The young clover is healthy. Potatoes have been sharply treated by the frost, it being difficult to obtain a considerable quantity devoid of saccharine affection. That otherwise pleasant principle is disagreeably misplaced in the potato. It is surprising, however, the degree of frost potatoes will endure in the ground. We lately had opportunities of seeing in Ireland, even in the north, quantities of potatoes taken up, after the unprecedentedly severe black frost of ten days, quite unhurt. Whether the lazy-bed system, with a deep trench on each side of the lazy-bed, renders the ground so dry as to prevent the action of frost, it is difficult to determine, for the land in many parts was naturally heavy, and even when the digging was proceeding, very cloggy. Would furrow-draining afford the same protection in winter to potatoes in heavy land? We should like to hear of the experiment being tried in this country. It could be done in this manner. Let a piece of heavy and wet-bottomed land, with a tolerable thickness of soil, be completely furrow-drained, and planted with potatoes in drill in the usual way. Let another piece of the same extent, in the same field, undrained, be drilled and planted with potatoes in the same manner as the other, but only that every fourth drill shall be left uncropped and the earth of it thrown upon the three drills on either side, so as to make complete trenches down to the subsoil, which shall embrace the drills of potatoes between them. Let both crops stand all winter.

examined after frost, and ascertained which of the methods produced potatoes unaffected by the frost. If none escaped, we may then conclude that Scotland has too frosty a climate for the potato in the field in winter; but if either escaped, furrow-draining may either enable us to keep our potatoes in the ground all winter, or an open trench must have greater efficiency in keeping ground dry in winter than the best furrow-draining. We do not think any farmers in this country could foretell the result of such an experiment; and, therefore, the comparative trial is a fit subject for experiment; the importance arising from the result to potato culture, no one can at present predicate. Hay has risen in price to an unprecedented height, being not less than 1s. 4d. per stone of 22 lb. Straw, in towns, is nearly as dear as hay usually is.

Stock, we fear, is placed on short allowance this winter. Lean beasts may perhaps be picked up cheap in spring, but fat cannot fail to be high priced. In estimating the result of this season on the condition of the Scottish farmer, we should say that money will be made on good, and lost on bad land.

Our readers will have, perhaps, observed the institution of a new Society in the metropolis, termed the Anti-Corn-Law Society, whose avowed object is not to modify or amend, but to repeal the Corn-Laws. It is not intimated whether any measure is desired to be substituted for them. The Society attempt to affect their object by the publication of cheap essays on the iniquity of taxing human food. Were their papers written with truth and candour, the landed interest would have no cause of alarm; for the more the subject of agricultural protection is considered and discussed, its reasonableness will become the more apparent. But who can expect fair argument, on the acknowledged rules of reason, from modern political economists, and free-traders in a one-sided reciprocity?

THE REVENUE.

ABSTRACT of the Net Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of Jan. 1836, and 5th of Jan. 1837,—showing the Increase and Decrease on each head thereof.

	Quar ters ended Jan. 5.		Increase.	Decrease.	Years ended Jan. 5.		Increase.	Decrease.
	1836.	1837.			1836.	1837.		
		£	£	£	£	£	£	£
Customs, . . .	4,520,415	4,069,938	..	450,477	18,622,908	19,716,440	1,093,534	..
Excise, . . .	3,347,783	3,813,764	466,001	..	11,544,760	12,744,174	1,199,414	..
Stamps, . . .	1,619,547	1,575,523	..	46,018	6,339,308	6,750,421	411,113	..
Post-Office, .	345,000	349,000	4,000	..	1,418,000	1,400,000	18,000	..
Taxes,	1,575,648	1,594,680	19,014	..	2,679,523	3,068,761	389,238	..
Miscellaneous,	21,570	8,873	..	11,703	68,866	40,850	28,016	..
	11,489,947	11,496,764	479,015	808,198	41,804,394	44,481,485	2,677,091	26,091
Deduct Increase,				479,015	Deduct Decrease,		19,438	
Decrease on the quarter,				20,183	Increase on the year,		2,540,222	

TABLES OF PRICES, &c.

The Average Price of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets:—

LONDON.						
Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1836.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 4.	53 6	40 4	28 4	34 10	42 6	37 11
11.	56 5	41 1	28 9	35 2	42 10	39 8
18.	61 5	41 10	28 9	36 6	43 6	40 9
25.	63 10	40 6	28 9	38 6	44 6	45 5
Dec. 2.	62 4	39 11	28 3	39 4	45 0	45 1
9.	63 10	40 3	28 3	40 10	45 8	44 7
16.	65 1	39 10	27 1	42 6	44 4	45 2
23.	62 6	37 11	26 6	44 2	43 6	45 1
30.	61 10	36 5	26 0	43 8	43 2	39 10
1837.						
Jan. 6.	62 8	37 1	26 4	43 6	42 0	38 4
13.	61 9	36 6	27 2	43 10	41 2	39 3
20.	60 11	36 8	26 8	42 2	40 6	36 6
27.	61 2	37 2	27 1	42 6	39 6	39 2

DUBLIN.						
Date.	Wheat Per Bar. 20 St.	Barley Per Bar. 16 St.	Bear Per Bar. 17 St.	Oats Per Bar. 14 St.	Flour Per Bar. 9 St.	
1836.	s. d.	s. d.	s. d.	s. d.	s. d.	
Nov. 4.	32 2	17 6	15 2	13 2	17 6	
11.	32 6	17 2	15 3	13 6	17 6	
18.	33 4	17 4	15 6	13 0	17 8	
25.	34 6	17 10	15 2	13 4	17 9	
Dec. 2.	36 0	18 0	15 6	14 0	18 0	
9.	36 6	18 8	15 8	14 4	18 6	
16.	36 10	18 4	16 0	15 0	18 10	
23.	37 2	18 6	15 10	14 8	19 10	
30.	38 0	18 4	16 10	15 6	21 0	
1837.						
Jan. 6.	39 6	18 2	16 6	14 6	22 3	
13.	39 4	17 6	15 10	16 6	23 0	
20.	38 0	19 0	17 0	16 0	21 0	
27.	38 6	19 6	17 6	16 8	21 2	

LIVERPOOL.						
Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1836.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 4.	56 10	32 7	26 10	35 1	43 2	46 0
11.	58 0	33 9	28 1	36 6	44 6	49 8
18.	62 9	37 5	29 0	36 10	44 10	50 8
25.	62 10	39 9	28 5	37 2	45 6	53 0
Dec. 2.	60 6	38 9	27 6	39 10	46 10	50 6
9.	61 10	36 2	27 4	40 8	45 8	53 1
16.	62 4	34 10	27 6	41 4	43 6	49 10
23.	61 9	36 2	27 0	42 6	43 10	50 5
30.	49 5	42 9	26 4	44 2	42 4	50 7
1837.						
Jan. 6.	60 7	39 3	26 2	43 6	40 8	50 2
13.	62 2	38 9	26 0	43 0	40 6	48 9
20.	62 7	36 3	26 6	42 6	39 6	49 10
27.	62 0	40 10	26 4	42 0	39 2	49 6

EDINBURGH.						
Date.	Wheat.	Barley.	Oats.	Pease.	Beans.	
1836-7.	s. d.	s. d.	s. d.	s. d.	s. d.	
Nov 2.	61 6	34 6	26 10	44 6	46 0	
9.	62 4	37 9	28 8	46 6	47 6	
16.	63 2	36 0	28 0	47 4	48 6	
23.	58 6	34 3	27 3	47 8	49 0	
30.	56 10	33 10	26 6	48 0	49 9	
Dec. 7.	60 6	33 1	26 9	48 0	49 0	
14.	61 6	34 9	27 4	47 9	48 9	
21.	60 10	35 0	27 1	47 0	48 6	
28.	61 0	33 3	27 0	45 0	48 6	
Jan. 3.	61 4	32 4	28 0	46 6	48 0	
10.	60 1	34 0	27 10	47 0	48 0	
17.	58 10	34 10	28 10	40 0	39 8	
24.	59 6	34 4	30 2	42 0	41 8	
31.	58 10	33 0	30 1	40 0	44 4	

TABLE showing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN CORN; the Duties payable thereon, from November 1836 to February 1837.

Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
4. 51 8	48 6	38 3	8 37 10	35 11	9 9	4 25 10	24 5	10 9	9 34 6	33 1	19 9	45 5	40 0	9 6	41 10	41 7	8 8
5. 56 6	49 9	37 8	8 38 11	36 7	7 10	26 10	24 11	10 9	9 35 4	33 9	19 9	43 11	41 0	8 0	44 4	42 0	8 6
6. 60 4	51 11	35 8	8 39 10	37 4	6 4	27 6	25 7	9 3	9 36 0	34 11	18 3	46 6	42 4	6 6	46 4	42 10	8 6
7. 61 0	54 5	32 6	8 39 10	38 0	5 4	27 0	26 1	9 7	9 42 6	36 4	15 6	46 6	44 4	5 0	47 10	43 11	9 5
8. 59 9	56 5	30 8	8 37 9	38 5	4 10	26 10	26 6	7 7	9 41 9	37 11	14 0	45 4	44 4	4 3	48 7	44 9	9 3
9. 60 4	58 2	28 8	8 37 4	38 6	4 10	26 5	26 9	7 9	9 44 11	39 10	11 0	43 2	44 4	3 6	48 7	44 9	9 3
10. 60 6	59 8	27 8	8 36 9	38 4	4 10	25 5	26 8	7 9	9 43 4	41 4	8 0	43 11	44 5	3 6	44 10	45 11	9 5
11. 59 2	60 3	26 8	8 35 6	37 9	6 4	24 10	26 4	7 9	9 43 1	42 5	6 6	42 2	44 2	3 6	43 11	45 11	9 5
12. 58 0	59 0	26 0	8 35 4	37 0	6 4	24 6	25 10	9 3	9 42 10	43 1	5 0	40 9	43 6	5 0	42 3	45 2	9 5
13. 59 0	59 7	27 8	8 35 5	36 5	7 10	24 11	25 6	9 3	9 44 6	43 5	5 0	40 4	42 5	6 6	41 0	44 1	9 3
14. 59 6	59 6	27 8	8 36 1	36 1	7 10	24 6	25 1	9 3	9 43 9	42 11	6 6	40 7	41 8	8 0	41 6	43 3	9 5
15. 59 1	59 4	27 8	8 36 0	35 11	9 4	24 3	24 9	9 10	9 41 10	42 5	6 6	39 6	41 0	8 0	40 5	42 4	9 6
16. 59 9	59 0	27 8	8 35 11	35 9	9 4	24 2	24 7	10 9	9 41 3	42 0	6 6	39 3	40 5	8 9	41 2	41 9	9 6

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, shewing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof, from 5th Nov. 1836 to 5th Jan. 1837.

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
Nov. 5. 1836.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . . .	18,067 6	..	18,067 6	117 1	1,533 6	1,649 7	548,124 3	28,434 7	576,558 0
Barley, . . .	2,552 0	..	2,552 0	5,974 4	..	5,974 4	33,438 6	25 1	33,463 7
Oats, . . .	10,130 2	..	10,130 2	1,638 3	..	1,638 3	241,329 6	686 0	242,015 6
Rye, . . .	1,559 7	..	1,559 7	..	..	..	6,719 2	..	6,719 2
Pease, . . .	2,603 3	..	2,603 3	176 6	..	176 6	6,138 6	..	6,138 6
Beans, . . .	974 6	..	974 6	20,966 6	..	20,966 6	24,919 8	..	24,919 8
Totals, . . .	35,918 0	..	35,918 0	28,903 4	1,533 6	30,436 2	822,944 4	28,225 0	851,169 4
Dec. 5.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . . .	13,193 7	3	13,194 2	77 0	2,391 4	2,468 4	548,846 5	28,143 6	576,989 1
Barley, . . .	5,293 5	..	5,293 5	4,989 7	..	4,989 7	33,731 0	25 1	33,756 1
Oats, . . .	10,481 2	..	10,481 2	731 2	..	731 2	247,829 6	686 0	248,515 6
Rye, . . .	..	..	..	..	..	..	6,719 2	..	6,719 2
Pease, . . .	3,369 4	1 4	3,641 0	357 3	1 4	358 7	2,144 1	..	2,144 1
Beans, . . .	1,829 1	..	1,829 1	2,593 0	..	2,593 0	24,978 5	..	24,978 5
Totals, . . .	34,437 3	1 7	34,438 2	8,739 4	2,393 0	11,132 4	871,873 3	30,834 7	902,707 0
Jan. 5. 1837.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.
Wheat, . . .	5,813 7	..	5,813 7	297 5	11,06 0	1,403 5	548,982 1	28,037 6	577,019 7
Barley, . . .	37,966 7	..	37,966 7	66,570 2	..	66,570 2	33,731 0	25 1	33,756 1
Oats, . . .	28,878 6	..	28,878 6	59,737 4	..	59,737 4	212,284 6	686 0	212,970 6
Rye, . . .	86 0	..	86 0	..	..	..	6,719 2	..	6,719 2
Pease, . . .	17,980 2	2 2	17,971 4	23,952 5	..	23,954 7	3,033 5	..	3,033 5
Beans, . . .	1,569 1	..	1,569 1	19,574 1	2 2	19,574 1	7,328 5	..	7,328 5
Totals, . . .	92,303 7	2 2	92,306 1	170,132 1	1,108 2	171,240 3	781,856 2	28,738 7	810,594 9
Nov. 5. 1836.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . . .	27,341 3 15	13,308 1 11	38,710 0 26	33 2 11	7,552 2 13	7,586 0 2	162,464 0 14	4,976 2 17	167,440 2 31
Oatmeal, . . .	..	..	..	..	..	..	78 1 31	..	78 1 31
Totals, . . .	27,341 3 15	13,308 1 11	38,710 0 26	33 2 11	7,552 2 13	7,586 0 2	162,542 2 7	4,976 2 17	167,514 4 48
Dec. 5.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . . .	23,057 0 5	3,459 3 12	26,516 3 17	21 2 26	1,667 3 17	1,688 2 14	160,843 3 3	6,270 2 12	167,113 5 15
Oatmeal, . . .	75 2 17	..	75 2 17	..	..	..	140 0 21	..	140 0 21
Totals, . . .	23,132 2 22	3,459 3 12	26,592 2 6	21 2 26	1,667 3 17	1,688 2 14	160,983 3 34	6,270 2 12	167,253 5 26
Jan. 5. 1837.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . . .	18,454 0 17	2,646 2 18	21,100 3 7	105 2 9	2,995 0 0	3,100 2 9	167,571 0 5	7,327 2 2	174,898 2 7
Oatmeal, . . .	191 3 14	..	191 3 14	20 0 25	..	20 0 25	78 1 31	..	78 1 31
Totals, . . .	18,646 0 3	2,646 2 18	21,292 2 21	125 3 6	2,995 0 0	3,120 3 6	167,649 1 12	7,327 2 2	174,976 3 43

PRICES of BUTCHER-MEAT.

Date.	SMITHFIELD, Per Stone of 14 lb.		MORPETH, Per Stone of 14 lb.		EDINBURGH, Per Stone of 14 lb.		GLASGOW, Per Stone of 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1836-7								
Nov.	7/6 @ 8/6	7/6 @ 8/6	7/6 @ 8/	7/6 @ 8/3	6/9 @ 7/9	6/6 @ 7/6	6/9 @ 7/6	6/6 @ 7/6
Dec.	7/9 8/9	8/ 9/6	8/ 9/6	7/9 8/3	7/ 8/9	7/ 8/9	7/ 8/9	7/ 8/9
Jan.	8/ 9/	8/3 10/	7/9 9/	8/6 9/6	7/3 8/3	7/9 8/3	7/9 8/3	7/9 8/3

PRICES of English and Scotch WOOL.

ENGLISH, per 14 lb.—Merino, 27/ @ 30/6; in Grasse, 20/ @ 25/—South Down, 22/ @ 24/; Leicester, Hogg, 24/ @ 26/; Ewe and Hogg, 21/ @ 24/—Locks, 13/ @ 15/; Moor, 10/ @ 12/6.
SCOTCH, per 14 lb.—Leicester, Hogg, 21/ @ 22/; Ewe and Wether, 20/ @ 22/6;—Ewe, 18/ @ 20/; Cheviot, White, 18/ @ 20/; Laid, Washed, 13/ @ 15/; Unwashed, 9/6 @ 10/6; Moor, White, 8/ @ 9/; Laid, Washed, 7/ @ 8/; Unwashed, 6/ @ 7/.

INDEX.

- ABERDEENSHIRE**, *fiar prices of*, for crop 1835, 109—*cattle crossed with the short-horns*, 498.
- Agricultural report**, quarterly, 102—*committee of the House of Commons*, 104—*colleges*, 255—*report*, quarterly, 258—*committee of the Commons ends in smoke*, 260—*committee of the Lords*, abstract of its report, 263—*report*, quarterly, 439—*report*, quarterly, 666.
- Agriculture of the county of Armagh**, on the, 54—*favourable opinion of the Quarterly Journal of*, quoted, 105—*of the county of Kerry*, 317—*studies in the science and practice of*, as connected with physics, 445.
- Agriculturists**, loan company for the relief of, opinion of its expediency, 104—*Manual*, a book of that name recommended, 266.
- Ammonia**, novel and important use of it, 438.
- Archbishopric of Glasgow**, *fiar prices of*, for crop 1835, 110.
- Argyllshire**, *fiar prices of*, for crop 1835, 109.
- Armagh**, on the agriculture of the county of, 54.
- Arrowroot**, size of the globules of, 455.
- Australian colonies**, 156—on the agricultural condition of, 515.
- Ayrshire**, *fiar prices of*, for crop 1835, 109—*cattle crossed with the short-horns*, 504.
- Baker**, Mr John, on a particular method of applying manure, 666.
- Ballingal**, Mr Robert, table of Fifeshire *fiars of wheat* from 1622 to 1835, 556.
- Banffshire**, *fiar prices of*, for crop 1835, 109.
- Barley**, size of the globules of, 454—its feeding powers, 460.
- Bathgate**, some account of the fairs in, 537.
- Bean**, on the culture of the, 310—small early mazagan, 311—long pod, 312—Sandwich, *ib.*—broad Windsor, *ib.*—soil and general culture, *ib.*—drill sowing, *ib.*—size of the globules of the, 455.
- Berwickshire**, *fiar prices of*, for crop 1835, 109.
- Biographical Memoir of the late Sir John Sinclair**, Bart., Founder, and first President of the Board of Agriculture, &c. (continued), 1, 111, 269.
- Blackadder**, Mr Alex. on the causes of failure in moss improvements, 169.
- Blacker**, Mr William, his book on the claims of the landed interest to legislative protection, reviewed, 213.
- Bog**, a moving, 257.
- Bread-making**, principles of, 462.
- Broccoli**, on the culture of, 82.
- Broxburn**, some account of the only fair in, 538.
- Buckwheat**, on the culture of, 180—size of the globules of, 455—its feeding powers, 460.
- Butcher-meat**, prices of, at Smithfield, Morpeth, Edinburgh, and Glasgow, from February to April 1836, 108—*from May to July*, 268—*from August to October*, 442—*from November to January* 1837, 588.
- Buteshire**, *fiar prices of*, for crop 1835, 109.
- Cabbage**, common and early York, on the culture of, 77.
- Caithness-shire**, *fiar prices of*, for crop 1835, 109.
- Cattle**, on a safe method of feeding them with potatoes, 243—on crossing breeds of, 247—on crossing the short-horn with other kinds of, 495—*with Shetlanders*, *ib.*—*with North Highlanders*, 492—*with Aberdeenshires*, 498—*with Angus*, 500—*with Fife*, 501—*with West Highlanders*, 502—*with Ayrshires*, 504—*with Irish*, *ib.*—*with Guernsey*, *ib.*—*with Indian*, *ib.*—*with Galloways*, 505.—The three kinds of, recommended for all Scotland, namely, Short-horns for the plains, West Highlanders for the hills and braes, and a cross between the West Highlanders and the Shetlanders for the mountain, 507. Judicious crossing only recommended, and that strongly, 508, *et seq.*
- Clackmannanshire**, *fiar prices of*, crop 1835, 109.

- Dextrine, a new vegetable substance discovered by the polarization of light, 451.
- Dickson, Mr James, on crossing breeds of cattle, 247—on crossing the short-horn with other cattle, 495.
- Draining, on an economical method of furrow, 244—tiles, on making them of peat, 246.
- Dublin, average prices of the different kinds of grain in, from February 5, to April 29, 1836, 107—from 6th May to 29th July, 267—from 5th August to 28th October 441—from November to January 1837, 587.
- Dumbartonshire, *fiar* prices of, for crop 1835, 109.
- Dumfriesshire, *fiar* prices of, for crop 1835, 109.
- Duncan's, Mr James, account of the turnip saw-fly, 558.
- Eddlestone, some account of the fairs in, 532.
- Edinburgh, average prices of the different kinds of grain in, from February 3 to April 27, 1836, 107—prices of butcher-meat in, from February to April, 108—average prices of grain from 4th May to 27th July, 267—prices of butcher-meat at, from May to July, 268—average prices of grain from 3d August to 26th October, 441—prices of butcher-meat in, from August to October, 442—average prices of grain from November to January 1837, 587—prices of butcher-meat from November to January 1837, 588.
- Edinburghshire, *fiar* prices of, for crop 1835, 109.
- English racer and saddle-horse, a work entitled a Comparative View of the form and character of them, reviewed, 570.
- Experimental farm not a suitable undertaking for the Highland Society, demonstrated, 264—on such farms, 553.
- Fairs, some account of them in Scotland, No. IV., Selkirkshire, 526—Selkirk, first, *ib.*—second and third, 527—fourth, fifth, and sixth, 528—Thirlstane Green, second and third, *ib.*—fourth, 531—Galasheils, first and second, *ib.*—No. V. Peeblesshire, *ib.*—Peebles, first and second, *ib.*—third, fourth, fifth, sixth, seventh, and eighth 532—the first and second at Eddlestone, *ib.*—the first, second, third and fourth, at Skirling, 533—West Linton, *ib.*—No. VI. Linlithgowshire or West Lothian, Linlithgow, first, second, third, fourth, fifth, and sixth, 536—Bathgate, first, second, third, fourth, fifth, sixth, and seventh, 537—Broxburn, 538.
- Fearnside, Mr William Gray, retrospect of the British and foreign corn trade during the half-year preceding May 1836, 85—during the half-year preceding December 1836, 414.
- Feeding, experiments on, 456.
- Fiar* prices for year and crop 1835, 109, 110—in Fifeshire from 1822 to 1835, 556.
- Fifeshire, *fiar* prices of, for crop 1835, 109—cattle crossed with the short-horns, 501—*fiar* prices in, from 1822 to 1835, 556.
- Flemish husbandry, some account of, 174.
- Flour, foreign, monthly returns and importations of, 108, 268, 442, 582.
- Flourens, M., the process of rumination or chewing the cud explained by his experiments, 344.
- Food, nutritious principles of, contained in grain and roots, 448—of plants, nutritious principles in it, 468.
- Forfarshire, *fiar* prices of, for crop 1835, 109—cattle crossed with the short-horns, 500.
- Galasheils, some account of the fairs in, 531.
- Glasgow, prices of butcher meat at, from February to April 1836, 108—from May to July, 268—from August to October, 442—from November to January 1837, 588.
- Goose, origin of eating it on Michaelmas Day, 258.
- Gorrie, Mr, on degeneracy of the potato, 582.
- Grain, increase of size in boiling, 468—observations on the growth and nutrition of, 463—ripening of, 471.
- Grain, foreign, weekly averages of, from February to May 1836, 107—monthly returns of the imports of, from 5th November 1835 to 5th January 1836, 108—weekly averages from May to August, 267—monthly returns of importations of, from 5th April to 5th July, 268—weekly averages from August to October, 441—monthly returns of importation of, from 5th August to 5th October, 442—weekly averages from November to January 1837, 577—monthly returns of importations from November to January 1837, 588.
- Grass lands, on an expeditious and economical method of improving in Scotland, 547.

- Gray, Mr Roderick**, on the disease in oats called *segging*, 76.
- Haddingtonshire**, *fiar prices of, for crop 1835*, 110.
- Hedge-birds**, on those which are alleged to be more or less destructive to field and garden crops, 38—remarks on the prevalence or deficiency of hedges in different parts of a country, 39—Non-destructive hedge-birds, 42—insectivorous hedge-birds which do not eat fruits or seeds, *ib.*—golden crested wren, 43—wood wren, and willow wren or hay-bird, *ib.*—chiff-chaff, 44—nightingale, 45—whin-chat, stone-chat, and wheat-ear, 46—wagtails, *ib.*—tree pipit or titlark, *ib.*—common fly-catcher, 47—flusher or lesser butcher-bird, 48—insectivorous hedge-birds which partially eat fruit or seeds, *ib.*—common wren, *ib.*—hedge-sparrows or dunnoct, *ib.*—redbreast, 49—redstart, 51—tomtit, *ib.*—coletit, and marsh-tit, 53—greater tit, *ib.*—Partially destructive hedge-birds, 184.—fructivorous birds which also feed on insects, *ib.*—blackcap, *ib.*—babillard, 185—fauvette, *ib.*—whitethroat, 186.—Destructive hedge-birds, 187—missel-thrush, *ib.*—song-thrush, 188—blackbird, 190—red-wing, and field fare, *ib.*—starling, *ib.*—Decidedly destructive hedge-birds, 284—goldfinch, *ib.*—siskin, 285—greenbird, *ib.*—yellow hammer, 286—cirl-bunting, 287.—seed-bunting, *ib.*—reed-bird, 288—corn-bunting, *ib.*—skylark, 289—woodlark, *ib.*—grey linnet, 290—mountain linnet, *ib.*—chaffinch, 291—mountain finch, 293—bulfinch, 294—house-sparrow, 295—methods of destroying sparrows, 300—tree-sparrow, 302.
- Highland and Agricultural Society Show at Perth** described, 406
- Holstein**, extracts from a journal of a tour in, 489.
- Horses**, on the past and present state of, 570.
- Horticulture**, common cabbage, early York cabbage, savoy, broccoli, early white Warwick pea, 76—peas, beans, 303—the onion, the leek, the early potato, 472.
- Husbandry**, on the application of steam to the purposes of, No. IV., 225—some account of Flemish, 174.
- Indian saw**, on an improvement in the, 85.
- Invernesshire**, *fiar prices of, for crop 1835*, 110.
- Irwin, Major**, his work on the present state and position of Western Australia, reviewed, 515.
- Islington market**, remonstrance against the combination formed against its success, 105—another remonstrance, 260.
- Johnson, Mr Arthur**, on an improvement in the Indian saw, 85.
- Kerry**, on the agriculture of the county of, 317.
- Kincardineshire**, *fiar prices of, for crop 1835*, 110.
- King, Mr Edward**, on the prevention and cure of rot in sheep, 190.
- Kinrosshire**, *fiar prices of, for crop 1835*, 110.
- Kirkcudbrightshire**, *fiar prices of, for crop 1835*, 110.
- Lanarkshire**, *fiar prices of, for crop 1835*, 110.
- Landed-interest**, its claims on the legislature for protection demonstrated, 213—can the legislature afford it relief, 260.
- Leek**, the, 482.
- Lefevre, Mr C. Shaw**, his remarks on the present state of agriculture reviewed, 368—state of the English farmer described, 356—burdens which affect agriculture in England, 371—those which are intended to be remedied, 373—Mr Lefevre acknowledges himself to be the author of the report which the Agricultural Committee rejected, 374—English farmer's capital gradually sinking, 375—occasioned by the low prices of corn, 376—the causes of the low prices enumerated, 378—Scottish farmer is better condition than the English, 380—corn rents recommended, 381—comparative expenses of farming in Scotland and England, 383—prejudice in England against long leases, 384—draining recommended, 385—remedial measures recommended for agriculture, poor-laws for Ireland, *ib.*—repeal of the malt-tax, 387—Mr Lefevre recommends an alteration in the corn-laws, 393—currency question, 399—recapitulation, 402.
- Lewis, Mr George**, his observation on the present state and future prospects of agriculture, illustrative of the advantages of experimental farms, reviewed, 538.
- Lindsay, Mr Henry**, on the agriculture of the county of Armagh, 54.
- Linlithgow**, some account of the, 536.

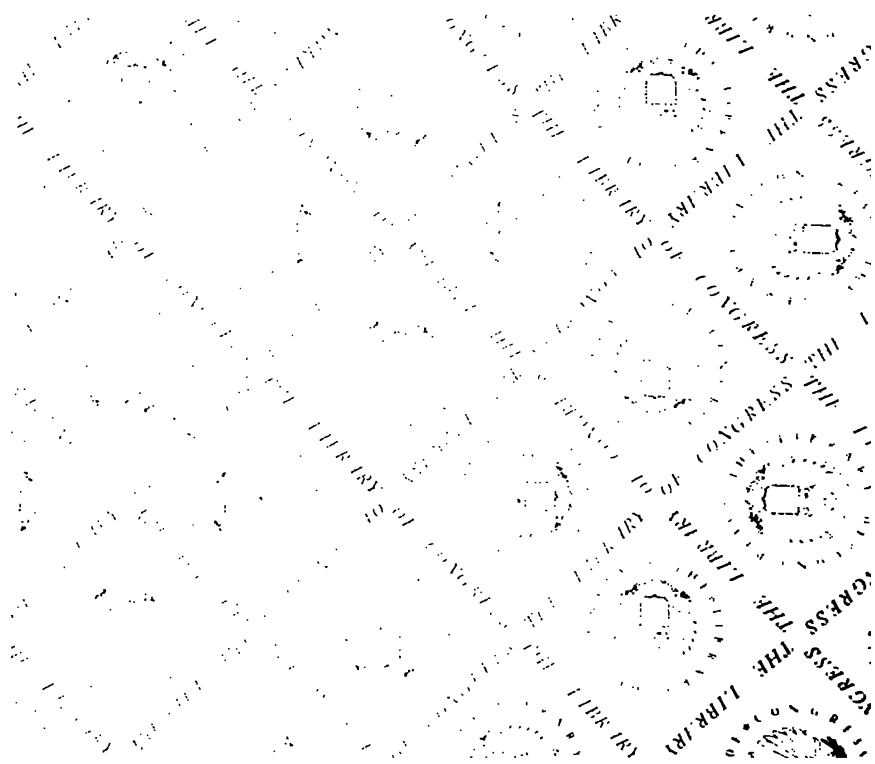
- Linlithgowshire, *fiar* prices of for crop 1835, 110; account of the *fairs* in, 536.
- Liverpool, average prices of the different kinds of grain in, from Feb. 5. to April 29. 1836, 107—from 6th May to 29th July, 267—from 5th August to 28th October, 441—from November to January, 1837, 587.
- London, average prices of the different kinds of grain in, from February 5. to April 29. 1836, 107—from 6th May to 20th July, 267—from 5th August to 28th October, 441—from November to January 1837, 587.
- Mackillop, M. G., his notes on the Australian Colonies, 156.
- Main, Mr James, on the culture of buck-wheat, 180.
- Maize, size of the globules of, 455—its feeding powers, 460.
- Mangel wurzel, orange, red, and white, 436.
- Miscellaneous Notices. — Agricultural cottages, 255—French and English rural comforts, Nantes, 256—A moving bog, 257—origin of eating goose on Michaelmas day, 258—Hickling's prolific wheat, 435—Whittington's wheat, *ib.*—Smoothev's or Bolshall new red wheat, *ib.*—Waterloo red wheat, 436—Cumberland early oat, *ib.*—orange red, and white mangel wurzel, *ib.*—on tanks of water, *ib.*—Meeting of potato dealers at Perth, 437—Novel and important use of ammonia and brine, 438—Mode of applying farm manure, 584—Canada wheat, 587—Mode of supporting the poor in Belgium, 588—Progress of digestion, 589—Stephens's writing fluid, 590—Grants of public money to Scotland, Ireland, for ten years from 1823 to 1833, 592—Machine on a new principle for raising water, coals, &c., 594—Shoes impervious to water, 594—Dovetailing wood, 595—Etymology of antimony, *ib.*—Succory coffee, *ib.*—New method of playing the violin, *ib.*—Wear of carriage wheels, *ib.*—Busts and portraits, 596—Burying in cross roads, *ib.*
- Moray and Elgin shires, *fiar* prices of, for crop 1835, 110.
- Morpeth, prices of butcher-meat at, from February to April, 1836, 108—from May to July, 268—from August to October, 442—from November to January 1837, 588.
- Moss, improvements, on the causes of failure in, 169.
- Nairnshire, *fiar* prices of, for crop 1835, 110.
- Oatmeal, foreign, monthly return of importation of, 103, 248, 442, 588.
- Oats, on the disease in, called *segging*, 76—Cumberland early, 436—size of the globules of, 455—its feeding powers, 460.
- Onion, description of, 473—summer onion, *ib.*—season of planting, 475—seed-crop, 478—crop for the winter from seed, *ib.*—culture, 479—preservation, 480—crop by transplantation, *ib.*
- Pea, early white Warwick, on the culture of, 83—early frame and Charlton, 404—Bishops early dwarf, *ib.*—Spanish dwarf, 305—Woodford's marrow, *ib.*—dwarf blue imperial, *ib.*—Frusian blue, *ib.*—Knight's tall marrow-fat, *ib.*—sugar, 306—times of sowing, 307—size of the globules of the, 464.
- Peat, on making draining tiles of, 246.
- Peebles, some account of the *fairs* in, 531.
- Peeblesshire, *fiar* prices of, for crop 1835, 110; account of the *fairs* in, 531.
- Perth, account of the Highland and Agricultural Show at that town in 1836, 403—account of the meeting of potato dealers at, *ib.* 437.
- Perthshire, *fiar* prices of, for crop 1835, 110.
- Ploughing in of green crops for manure, 471.
- Polarization of light used in ascertaining the structure of vegetable products, 477—it discovers dextrine, 451.
- Potatoes, on the winter management of, 150—on a safe method of feeding cattle with, 243—meeting of dealers in them at Perth, 437—size of the globules of, 454—early 482.
- Quarterly Agricultural Report, May 1836, 102—August, 258—November, 493—February 1837, 666.
- Railroads as a speculation for the landed interest, 104.
- Renfrewshire, *fiar* prices of, for crop 1836, 110.
- Retrospect of the British and Foreign Corn Trade during the half-years preceding May 1836, 85—during the half-year preceding December 1836, 414.
- Revenue, the, of the year and quarter ending 5th April 1836, 109—ending 5th July, 266—ending 10th October, 440—ending January, 586.
- Ross and Cromarty shires, *fiar* prices of, for crop 1835, 110.
- Rot in sheep, on the prevention and cure of, 190.

Roxburghshire, *fiar* prices of, for crop 1835, 110.
 Rumination, on that process as explained by the experiments of M. Flourens, 344.
 Rural comforts, French and English compared, 256.
 Rye, size of the globules of, 455—its feeding powers, 459—on the growth of, 468.
 Salt, on purifying that made from sea water, 313—to purify it by crystallization, 315—by washing, *ib.*—novel and important use of, 438.
 Sap, theory of the circulation of the, 464.
 Savoy, on the culture of the, 82.
 Saw, Indian, on an improvement in the, 85.
 Segging, on the disease in oats called, 76.
 Selkirk, some account of the fairs in, 526.
 Selkirkshire, *fiar* prices of, for crop 1835, 119—account of the fairs in, 526.
 Sheep, on the prevention and cure of rot in, 190.
 Sheep-fluke, its injurious effects on the sheep described, 210—its habits described, 212.
 Sinclair, Sir John, his biographical memoirs continued—works of a similar kind as the Statistical Account of Scotland, attempted unsuccessfully in other countries in Europe, 1—Sir John proposes in 1793 the establishment of a Board of Agriculture, 8—curious literary wager between him and Mr Arthur Young, 9—original members of the Board of Agriculture, 10—its first proceedings, 11—he embodies a regiment of fencibles in 1794, 17—commands the camp at Aberdeen, 18—his tract on the health and diet of soldiers, 19—communication to the Board of Agriculture first published in 1797, 21—he proposes to Pitt the issue of Exchequer Bills to alleviate commercial distress in 1793, 22—his general bill of enclosure, 23—he publishes his history of the revenue of the British empire in 1802, 24—his opinions on various public questions, 25-30—in 1803 he publishes his *Hints on Longevity*, 30—his correspondence with Mr Dempster on sending salmon to the London market in ice, and on planting, 31—he plans an experimental farm, 34—his services to agriculture appreciated abroad, 35—list of diplomas sent him from abroad, 38—he was the first to make Elkington's method of draining public, 111—he

induces Dr Darwin to publish his *Phytologia*, 112—he publishes his *Code of Health*, of which work a short analysis is given, 113—he publishes his account of the husbandry of Scotland in 1812, 118—in 1819 he publishes his *Code of Agriculture*, 121—that work is shortly analyzed at, *ib.*—he is deprived of the Chair of the Board of Agriculture through the influence of Pitt, 123—he is again reinstated some years after, 125—in 1811 he is appointed cashier of Excise for Scotland, 125—his kindness to Andrew Meikle, inventor of the thrashing machine, *ib.*—in 1810, Sir Humphrey Davy appointed chemical lecturer to the Board of Agriculture, through his means, 126—his attention to Mr Macadam for his improved system of road-making, 127—list of Agricultural Societies of which he was elected honorary member, 128—in 1815 he publishes his *Hints on Flemish Agriculture*, 129—he translates the opinion of French authors on the diseases which affect grain 130—his different visits to the Continent, 131—his exertions regarding the publication of Macpherson's translation of Ossian's poems, 135—he attempts a *Code* or *Digest* of Religion, 140—in 1819 he proposes associations for the collection and diffusion of useful knowledge, 141—he promotes cattle and sheep shows, and obtains the patronage of the Highland Society for them, 144—list of his various works, 145—announcement of Rev. John Sinclair's memoir of his father, 149—state of agricultural literature during his life, 270, *et seq.*—his efforts at the time of the cholera, 274—a retrospect taken of his services to science, literature, and agriculture, 277, *et seq.*—his last illness on 15th December 1835, 282—his death on the 21st, *ib.*—proposed honours to his funeral, by the Town Council of Edinburgh, and the Highland Society, *ib.*—his personal appearance described, 283—is no monument to be raised to his memory? *ib.*
 Skirling, some account of the fairs in, 532.
 Smithfield, prices of butcher meat at, from February to April 1836, 108—from May to July, 268—from August to October, 442—from November to January 1837, 588.
 Steam, on the application of it to purposes of husbandry, No. IV. :
 Stirlingshire, *fiar* prices of, for 1835, 110.

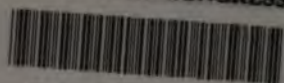
- Studies in the science and practice of agriculture as connected with physics, 445.
- Sugar beet company announced. 104.
- Sutherlandshire, fair prices of, for crop 1835, 110.
- Thirlstane, some account of the fairs in, 528.
- Thomson, Alex. Esq., account of Flemish husbandry, 174.
- Towers, Mr., on the cultivation of the common cabbage, early York cabbage, savoy, broccoli, early white Warwick Pea, 76—on the winter management of potatoes, 150—on the culture of peas, 303—on the culture of the bean, 310—on the culture of the onion, the leek, and early potato, 472.
- Turnip saw-fly (*athalia spinaria*), ac. count of it, 558.
- Water, on tanks of it for supplying people and cattle, 436.
- West Linton, some account of the fair in, 533.
- Wheat, Hickling's prolific, 235—Whittington's, ib.—Smoothey's new red, ib.
- Waterloo red, 436—size of the globules of, 454—its feeding powers, 461—on the growth of, 469—fairs price of, in Fifeshire, from 1622 to 1835, in series of nineteen years, 556.
- Wigtonshire, fair prices of, for crop 1835, 110.
- Winter, management of potatoes in, 150.
- Wool, prices of Scotch and English, 106 268, 442, 588.





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